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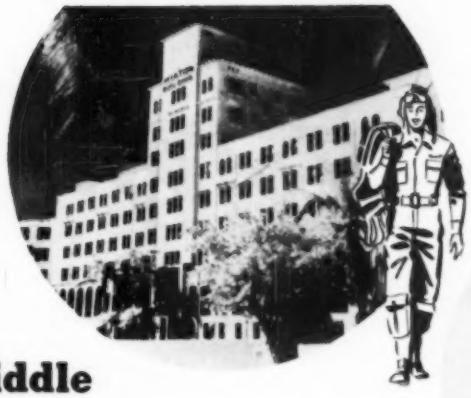

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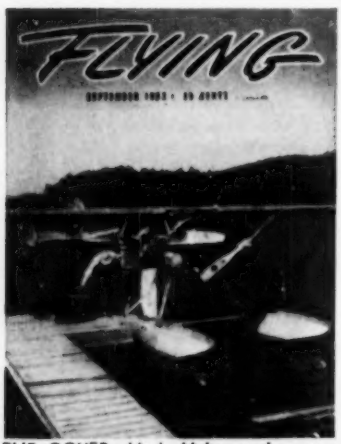

THE COVER: Herb Helms and a passenger prepare to take off from Long Lake, N. Y., in a Cessna 195. *Photo by C. L. Hamilton.*

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Dreams span the seas sometimes

TWA DOES IT TEN TIMES A DAY

A boy and his thoughts by the side of the sea! Do you remember when *your* imagination wore seven-league boots and carried you off to fabled cities in far-off lands, where languages and distances didn't matter? Maybe it's time to *live* those dreams. For today is the age of the swift TWA Constellation—the modern magic carpet that can speed you almost anywhere a dream can go in less than a single day. Yes, today the whole world is yours to enjoy when you follow your flights of fancy . . . via TWA.

Where in the world do you want to go? For information and reservations, call TWA or see your travel agent.

***Fly the finest...* FLY TWA**

TRANS WORLD AIRLINES

MAIL BOX

WOE IN THE WEST

I can feel for Frank Harvey ("If You Check It," FLYING, June) in his engine trouble while pulling up that long, long slope to the pass east of Albuquerque.

Last March I bucked a wind of "whole gale" force up that slope. I was barely making 60 mph groundspeed with an indicated airspeed of 105 at 10,000 feet in a Cessa 170. I never before felt so dependent on power flow, until two days later when flying from Albuquerque to Needles at about 75 GS at 13,500 feet over the terrain Mr. Harvey so accurately describes. I had to land at Winslow, Ariz., for gas and both the landing and take-off took all I had and a bit over! In that country one is dependent on engine performance to a degree that must be experienced to be comprehended.

G. V. CAESAR

Harbor Beach, Mich.

SHOOTING THE PHOTOGRAPHER

I appreciated the June cover of FLYING very much. In looking through my scrapbook I found a picture of the photographer taking your cover picture. I'm enclosing same, since I thought it quite a coincidence.

LAINE C. FRANK

Dallas, Texas

INVERTED FLIGHT

The illustration on page 18 of your July issue (in "How to Fly the Mountains") must be intended for "Wrong-Way Corrigans" who like to fly upside down.

Being in the publication business ourselves (The Polled Hereford World Magazine), we feel for you—this business of upside down cuts happens in the best of families—although it's a little harder to get a bull upside down than a drawing.

The article was of more than passing interest because of our plan to fly our main staff by private plane to San Francisco this fall for the National Polled Hereford Show.

A little brushing up on the things one doesn't run into every day never hurt anyone, and many of your articles have been helping us do just that for a good many years.

FRANK W. FARLEY, JR.

Kansas City, Mo.

● *The first bound copy of the July* FLYING *hadn't been in the office 10 minutes before the upside-down cut was discovered—but it was too late then. We thank all the sharp-eyed readers who called it to our attention, but we chose Mr. Farley's letter to print in gratitude for his heart-warming diplomacy.*—ED.

TIME SAVER

In re the story "Helicopter Ambulance" (FLYING, May), where they used a helicopter to transport wounded men from a C-54 hospital ship to Bethesda Medical Center—I know the run by road, from Andrews AFB to Bethesda, and it sure would take more than the hour mentioned in the story.

Unless I am mistaken, it takes between 1 hr., 30 min., and 1 hr., 45 min. When the traffic is heavy—6-8 a.m., 12-2 p.m. or 4:30-6 p.m.—it will take a full 2 hours. I've driven it many a time at all hours of day and night. I was one of the night crew of drivers at Andrews for about 17 months.

RICHARD E. THOMPSON, JR.
A/1c, USAF
APO 192, c/o PM, New York, N. Y.

NOW HEAR THIS

It may be of interest to know that we use FLYING Magazine extensively in the teaching of our courses, and copies of the magazine are maintained in our library for student use. We have found that FLYING is one publication that keeps our instructors and students more abreast of air developments than any other publication.

CARROLL V. GLINES
Major, USAF
Dept. of Air Science and Tactics
AFROTC Detachment #675
University of Oklahoma
Norman, Okla.

CURTISS HAWK

I am looking for an old time Curtiss *Hawk*. For years I've been asking around at various fields but no one seems to know where any of the Curtiss series are today. My favorite was the P-6E but if I could locate any one of this series I would be very appreciative.

NEIL NOVEMBER

1400 West Marshall Street
Richmond 20, Va.

CONTRACT SCHOOLS

Congratulations to FLYING and to writer Gordon C. Sleeper for a fine presentation on "Contract Schools" (FLYING, April).

Little enough attention has been focused on this system of civilian-military cooperation in flying training. To my knowledge, FLYING's excellent article is the first magazine feature to discuss in any detail this new concept of the primary pilot training program conducted for the Air Force by private industry.

JAMES R. GREENWOOD

Hawthorne School of Aeronautics
Moultrie, Ga.

PURCHASE PAINS

Mr. Norwood's article on "Purchase Pains" (FLYING, June) made me think back to the time in 1945 when I bought a Piper *Cub* for a group of fellows. Having previously bought and sold seven other planes, I shouldn't have gotten into such a mess.

The airplane had been wind damaged and repaired, supposedly by an approved repair station, and I bought the plane with a verbal agreement that it was ready to fly. I flew it back home and in a few days was notified by CAA that it would have to be re-licensed. The plane stayed tied out for two months before I got the title and registration straightened out. By that time, the airplane needed more A&E work done before it could be re-licensed.

The fellow I had bought the plane from had, in the meantime, moved away. When I located him he said he was sorry the way things had happened and would do anything to satisfy us, even to returning the full purchase price, which we promptly accepted. He was an honest Joe and even gave me $25 for clearing the title and trouble he had caused.

We later bought a 50 hp Taylorcraft which, in January, 1949, I flew to Shippigan Island, New Brunswick, Canada, landing on the frozen bay and later on the island itself. I was later informed that it was the first foreign airplane to land on this island. In 1939 or 1940 the Russians in a flight over the North Pole to New York got off course and crash-landed on Miscou Island, the smaller island above Shippigan Island.

ERWIN E. STOCKWELL

Orange, Mass.

ATTENTION, SPORTSMEN

The hunting, fishing and skiing resort town of Hayward, Wisc., has reopened its municipal airport under the management of former airline flight and maintenance personnel. Fuel, maintenance and tie-downs are available and the field has 2,900-foot sod runways.

NED W. FINNELL
Co-manager, Hayward Airport
Hayward, Wisc.

LAMBERT LAUDED

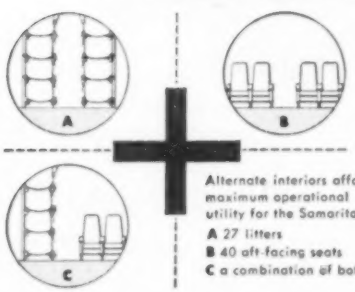
I have flown a private plane in almost all of the States and most of the countries in Latin America and many parts of Africa, and I have yet to find a place where I got as good service as at Interstate Air Motive, at Lambert Field, St. Louis, Mo.

GEORGE R. BLODGETT

Boston, Mass.

(*Continued on page 9*)

...A NEW ANGEL OF MERCY FOR THE ARMED FORCES



Alternate interiors afford maximum operational utility for the Samaritan:
A 27 litters
B 40 aft-facing seats
C a combination of both

CONVAIR'S FLYING SAMARITAN, the ultimate in "flying hospitals," is the Air Force's first pressurized twin-engine air evacuation transport. The Convair Samaritan fleet, known as C-131A's, will be equipped with modern facilities for air-borne treatment and comfort.

The Samaritan is *another* military version of the Convair-Liner, the world's most popular passenger plane . . . choice of leading airlines.

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Leadership Demands Constant Achievement

Lockheed's huge Marietta, Georgia, factory speeds output of U.S. aircraft

EXPANDS DEFENSE PRODUCTION IN INDUSTRIAL SOUTH

Lockheed and the growing Industrial South today provide the U.S. with one of the world's largest aircraft factories—Lockheed's huge Marietta, Georgia, plant.

A short distance from Atlanta, this factory complements Lockheed's California Division, providing the industrial dispersal now considered vital to U.S. defense.

Lockheed's Georgia Division employs over 13,000 people and has an $800 million backlog of plane orders. That's big business—and an excellent example of new production in the fast-growing Industrial South.

This Lockheed plant is currently producing big Boeing B-47 bombers for the U.S. Air Force in a cooperative defense effort. Soon the plant will also produce America's first airplane originally designed for turbo-prop power, the Lockheed C-130A cargo transport for the Air Force.

Look to

Lockheed

for Leadership

LOCKHEED AIRCRAFT CORPORATION • MARIETTA, GEORGIA, AND BURBANK, CALIFORNIA

(Advertisement)

Lockheed

C-130A Transport—
One Plane for 3 Jobs

Soon in production at Lockheed's Marietta, Georgia, plant, the U.S. Air Force's new turboprop transport, the Lockheed C-130A, will fly higher and faster than any other military transport and perform a great variety of missions.

The C-130A is the first transport specifically designed for turbo-prop engines, which harness jet power to propellers.

Air Force Competition Winner

Winner of an industry-wide Air Force design competition, the C-130A transport will perform three different jobs:

1. Carry soldiers, paratroops, patients and all types of ground force equipment up to items weighing twelve to twenty tons.

2. Fly high-altitude, high-speed missions as a tactical airplane for the Air Force.

3. Transport passengers on long-range flights for the Air Transport Command.

Unique Construction

The C-130A has a floor as strong as a concrete warehouse floor a foot thick. Its fuselage is only 45 inches off the ground—level with truck-bed height for easier loading and unloading. The pressurized cabin permits ground-level comfort for military personnel at high altitudes.

Of special importance to the Air Force, the new transport will require only short take-off and landing runs. Special tandem-wheel tricycle landing gear permits it to use emergency landing fields in forward areas, or even unfinished air strips.

Prototypes of the airplane are nearing completion at Lockheed's Burbank, Calif., plant. The plane will go into quantity production at Lockheed's Georgia Division, in Marietta, where giant B-47 jet bombers are currently being built.

MAIL BOX

(Continued from page 6)

AVIATION IN THE SCHOOLS

I would like to explain what has been done about aeronautical training in Fort Worth.

Three years ago the Public School System announced that Technical High School would offer a complete Aircraft and Engine Mechanic course. The course opened in September, 1951, headed by W. I. Lane, an engineering grad of Texas A&M, a rated A&E mechanic and ground instructor, and an ex-engineering and maintenance Air Force officer.

The department now has four instructors and about 200 students. We are set up in a large, hangar-type building and the majority of the work is done on live aircraft.

Our Aeronautical Department has won state-wide recognition and has won many state-wide honors. This June the first group will graduate from Technical High's Aeronautical Department, a good percentage of them with A&E licenses. I am proud to say I am one of those boys who will have a great head start in aviation.

CHARLES E. SINCLAIR

Fort Worth, Tex.

In answer to the letter by Arnold H. Downs (FLYING Mail Box, April), I agree with some of his comments but can't hold back my feelings on the rest. I do agree that aviation courses should be put into high schools and that the government should promote these courses in order to train men before they go into the Air Force.

On the other hand, I can't see why any young man would turn to hot rods if he REALLY WANTS TO FLY.

Take my case: I decided that I wanted to fly when I was 13. I didn't have any money, either, so I got a part time job. I worked after school and on Saturdays for 80c an hour. This netted me, after taxes, between $12 and $16. I would go to the airport on Sunday and use this money to fly. Flying was expensive ($10 per hour), but flying is something that can't be learned in a day. Though the overall expense is fairly great, each lesson does not require a great investment.

Several other boys my age who drove hot rods scoffed at me because they thought I was wasting my money on flying when I could have so much fun racing them down the highway. I knew what I wanted to do so I ignored them.

In a period of several years I advanced myself to a commercial pilot with instructor and instrument ratings. I am now employed at Columbus Air Force Base as a flight instructor at the age of 20. The work up to now has been hard—harder than driving hot rods. I wanted to fly, and I set out to learn.

It seems as if some people who want to fly will gladly accept it on a silver platter, but on the other hand will give it up if there are a few rivers to cross because they don't have a boat. Yet they can swim!

EDWARD B. ROBERTSON

Columbus, Miss.

Hats off to the letters by Arnold H. Downs and Robert W. Fortin in the April Mail Box. I'm 16 years old and I've been interested in aviation about one year. I've been up 11 times in that year and have paid anywhere from $2 to $4.75, depending on the length of time and plane. And that is pretty expensive for me. It sure would help us out if the adults would pitch in and help us.

MICHAEL C. LANE

Oklahoma City, Okla.

BRETHREN IN BRITAIN

Our club, the Birmingham and District Aviation Club, have just instituted a subscription to FLYING and find it of great use and interest to us in our search for historical data on aviation, one of the main functions of the club. Another of the main interests of our members is the collection of aircraft photographs.

Being a member of the Royal Observer Corps, I found the article on the Corps (FLYING, April) very interesting, it being nice to know that our voluntary service is now known about over in the States. I believe you have recently instituted a similar organization of sky-watchers and I would like to send best wishes to your observers. We shall be pleased to hear from any of your readers at any time.

PETER F. WRIGHT

Birmingham & District Aviation Club
Cavendish House
40 Waterloo Street
Birmingham 2, England

KITS IMPRACTICAL

Having had experience owning and operating both airplanes and gliders, and presently being engaged in building a glider, I would like to state that kits as an economy move are impractical for the following reasons:

1. A kit providing factory welded fuselage, fittings and materials for wood wings would run $500 less engine and instruments. The finished aircraft would have an investment of close to $1,000.

2. To this must be added 500 to 1,000 hours of labor, i.e., one to two man-years of spare time.

3. The resulting product is of low resale value.

To go to the expense, effort and risk just to get something to fly is impractical. Rather I propose that effort be directed toward working on the "kits" now available at most airports in the form of weary lightplanes with weary engines that can be bought and rebuilt for half the cost of starting from scratch.

Please don't take this letter as opposing the home building of aircraft. Rather I feel that the time and effort required to build such a plane should result in a product worthy of the individual's talent. Not just another lightplane.

ALAN H. SCHMID

Media, Pa.

(Continued on page 44)

FLYING
VOLUME 53, NO. 3
SEPTEMBER, 1953

AN EDITORIAL

A Place to Think

SEVERAL years ago I was visiting my old friend, General Carl A. Spaatz, at the time he wrote out his request for retirement as Chief-of-Staff of the Air Force.

It was a moment to be marked . . . this folding of wings after so many years on so many skies. At such a time a man of stature has long thoughts reaching both backward and forward. It was a time to ask a question. I said, "Tooey, what from all the varied experiences of your career now at retirement seems to you to have been most worth while . . . most far reaching?"

General Eisenhower had called Spaatz the greatest of air strategists. Airmen the world over had respected him as a confrere or feared him as a foe. His plans had leveled Hitler's Europe. He had made weighty decisions and survived countless adventures. I wanted to know which phase of all of it he most cherished.

His answer came without hesitation. "The founding of the Air University is by all odds my greatest satisfaction."

That was scarcely the answer to expect from a man who had flown combat, led air armies, and walked the stage of world history. But it was a wise answer.

American aviation needs nothing so much as the creation of an intellectual climate which airwise will produce national imagination and inspiration. Today . . . 50 years since Kitty Hawk . . . despite our revolution of military science and civil commerce, despite our opening of gates to vast prospects of social progress, we remain singularly unable to stimulate society. We have not carried our culture forward with our technology. We have produced scant literature worth the name, less art and still less song. In fact we have failed, as Mr. William Enyart pointed out in the August issue of FLYING, to so much as stir the imaginations of enough youth to meet our engineering and piloting requirements. During last year, for example, more personal airplanes were purchased by men between the ages of 40 and 60 than by men between the ages of 20 and 30.

Editorially the original flight of the Wright brothers was treated in general with skepticism, and much of that moss has survived the half century. There are some brilliant exceptions but in the main the treatment of the most revolutionary force of modern times has been shallow and cynical. No statesman of the free world has interpreted foreign policy in terms of the air ocean and specifically our own statesmen have refuted airpower as an instrument capable of keeping the peace if used for that purpose.

In Washington the defense picture purports to be an economy campaign and would to heaven it were just that. But it isn't that by any means. It is a deep-rooted interservice clash with some of the weirdest angles ever refracted on the Potomac. There will never be economy without danger to security until there is unequivocal unity of the service branches. How this is to be attained is subject to study but its attainment lies at the root of defense economy. It appears reasonable to hold that if the military establishment were geared strictly to the support of foreign policy rather than to inter-service rivalry the budget could be reduced by a full third and better actual defense achieved. But that would pinch everybody and seems impossible to a government long schooled in the philosophy of universal love.

Yet Washington is not the sole scene where intellectual stature is unmatured for the air age. The civil airlines themselves put up a sorry show. Consistently faced by economic disaster due to the high rate of aircraft obsolescence, each goes its own tortuous way in the fair name of competition where all could attain a greater vantage in the name of unity. If any clincher were needed to illustrate the dire lack of long range philosophy for the air age we have but to note the negligible provisions to attract our youngsters. The lopping off of the Civil Aeronautics education program was a typical gesture in the wrong direction.

Now certainly the Air University of the Air Force will not by itself project an intellectual atmosphere adequate to the air age. Nor will the Air Force Academy when it comes into being. Nor will the CAA or the Press of the country, or the school programs of the Civil Air Patrol alone or jointly teach the people to think in terms of their modern world. But all are significant forces directed to a vital end and probably General Spaatz was right . . . his most enduring service to the future of his Country was to create a place where men had to think.

Gill Robb Wilson

Gill Robb Wilson
Editor and Publisher

FULL-FEATHERING Propellers Put Greater Surety "Out Front"

American took a big step forward in passenger safety in 1937, when, on its DC-3 Flagships, it began to use full-feathering propellers that had been designed and built by the Hamilton Standard Propeller Company in conjunction with American Airlines.

Until then, propellers had just two pitches—one to use for take-off, the other for cruising. The new propeller could be "feathered"—its blades turned so that only the edges faced the airstream—in case of engine failure.

With these full-feathering propellers, the drag of a dead engine could be minimized. And the fact that the propeller remained stationary instead of turning, further reduced the risk of motor vibration and increased passenger safety. Thus it is not surprising that full-feathering propellers with automatic controls are now standard equipment the world over for commercial aircraft.

The introduction of the full-feathering propeller is only one of many milestones in the history of air transportation that have been inaugurated by American Airlines.

AMERICAN AIRLINES INC.

America's Leading Airline

SWEAT vs. TEARS

The business is still there—

the trick is to go out and get it!

By ARTHUR HUG, Jr.

"IF YOU want customers, go out and get them. Don't wait for them to come to you, because they won't!"

That's Ed Lyons speaking, and he knows whereof he speaks. Lyons is manager and administrator of Zahns Airport, Inc., Amityville, Long Island, home base for 200 private and corporation aircraft and for 400 to 600 flight students at any given moment.

There's a paradoxical belief current today, shared by many private airport operators, that thousands of people want to fly, but don't. What to do about it?

Lyons has been busy providing the answer since 1945, when he opened a flying school at Zahns, with a second-hand Aeronca *Champ* as his flying equipment and a used car as his office. Now, eight years later, he is one of four equal partners in a corporation that grossed nearly $500,000 last year and promises to top that in 1953.

I first met Lyons in the editorial office of a newspaper where I worked. He was there to report an interesting news story he had come across that afternoon. It later struck me that although there are half a dozen private airports in the area covered by the newspaper's circulation, he was the first and only airport representative I had ever seen in the office.

I soon discovered that this was only one of many ways in which Zahns, and its flight training school, Amityville Flying Service, Inc., was aggressively promoting flying throughout Long Island and the metropolitan New York area.

Zahns Airport was 40 acres of apple orchard when

Aerial view of Zahns Airport shows two large hangars under construction, hard-surfaced north-south runway, tied-down planes and Air National Guard L-19's (to right of Zahns hangar). Republic Aircraft Corp. runways extend along top in background.

Part of corporate fleet of 40 aircraft lined up on apron. Planes include Grumman *Mallard* of N. Y. Daily News and Twin Beech in which the Levitt brothers commute to Pennsylvania where they're building Pennsylvania's "Levittown." In spite of the visual evidence here, the field is correctly known as Zahns Airport, Inc. Seems the logical apostrophe was overlooked when incorporation papers were drawn up.—*Photo by Newsday.*

Joe Zahn cut in a small landing strip back in 1936. (Burbank Central Air Terminal in California is another airport that grew out of an apple orchard.) Zahn and his friend, Jack Looney, operated a J-3 *Cub* from a small field several miles away, and Zahn wanted a personal strip close to home. He bought the orchard and flew to and from work until the beginning of the war, when the 1,200-foot runway was cultivated to help augment the nation's food supply. Looney served during the war as a lieutenant commander in the Navy's air arm.

In 1945, Lyons leased part of the land and opened his flying school. Walter Hoffman joined Zahn and Looney and started a second school on the opposite side of the field. The total equipment of the two schools was three airplanes.

Like hundreds of other private operators after the war, the quartet waited patiently for the customers who were going to "blacken the skies with private aircraft." None came. For days they would stare at each other across the field, waiting to see who would pick up the first customer. Before long both schools realized that they'd have to drum up some business or cease operations.

In 1946, Lyons was instrumental in persuading the Government to include flying under the G.I. Bill of Rights. By 1948, the two schools had approximately 35 airplanes and were averaging 300 to 400 G.I. students plus an equal number of non-G.I.'s. By 1949, the two schools were logging over 20,000 hours a year and had more than 100 private aircraft based and operating at the field.

The four partners at Zahns Airport who have proved that a profitable private airport is still a possibility. Left to right: Ed Lyons in the *Widgeon* cockpit; Jack Looney, Walter Hoffman, Joe Zahn. —*Photo by Newsday.*

The two operations had one unusual aspect. For competitors, they were amazingly cooperative. They loaned each other airplanes when the traffic load became heavy. They swapped equipment, helped on maintenance and shared hangar space—all in the interest of promoting flying. The merger in 1950 was a natural consequence of this unusual competitive relationship, described by the Aviation Bureau of the New York State Department of Commerce as "one of the most unique four-man partnerships in the history of state aviation."

Hoffman, who has been flying since 1932, is in charge of the school. Zahn, an aviation engineer, is responsible for the upkeep and development of the field, while Looney runs the aircraft maintenance department. Lyons functions as airport manager and administrator.

In the past seven years, the four pilot-businessmen have logged a total of 250,000 student training flight hours and have transformed the one-time orchard into a million-dollar investment sprawled over some 120 acres. The 4,200-foot, hard-surfaced runway handles DC-3's with ease. Zahns has been called the largest private operation east of the Mississippi.

The number of based aircraft now totals approximately 200, 70 of which are housed in 35 "T" hangars and two concrete hangars. Under construction are two more concrete hangars large enough to house four DC-3's. Half completed is a 3,000-foot east-west runway and the installation of permanent runway lights. Maintenance plans call for facilities to handle major repair jobs on four-engine aircraft.

Plans have been drawn for a new administration building which will house a large modern restaurant and contain a new Link room as well as an enlarged waiting room and operations office. A new hangar is under construction for the Air National Guard, which already has 40 L-19's and two *Navions* based at the field. The hangar, however, will be used primarily for the 10 helicopters which will be based here as soon as they are available.

Boundary and obstruction lights are already in operation and additional space is being set aside for an anticipated increase in tie-downs, now totaling 68.

All of the tie-down aircraft and more than half the hangared planes are privately owned. For the most part, they are used exclusively for sport flying. There are three flying clubs, with one plane each, and a CAP unit, which uses Zahns as a base for its Search and Rescue organization. The field has also (*Continued on page* 57)

Is there any foolproof formula to solve the propwash problem?

Gremlins sometimes get you

By CARL C. HOFFMAN

I HAD a "Tip on Flying" published in FLYING Magazine some time back. The gist of this little masterpiece was that if Mr. Everyday Pilot minded his P's and Q's, flew by the book, and profited by the mistakes of others, his chances of becoming an old pilot were very good. I further advised clipping news items on all air accidents, and holding your own post mortems, asking yourself what caused each accident and how to prevent it from happening to you. My observations were based on 15 years private flying, plus a few years instructing for the Army—all accident free.

I now have a new article clipped from the front page of the *San Antonio Light*. Its heading reads "Three Safe in Air Accident". I am trying to follow through with my usual deductions. While my explanation might be questioned, I do know what happened. I was the pilot.

As a contractor, cross-country trips to jobs in progress are routine for me. It's an ideal set-up, with 90 per cent of our work at Air Force bases. While the fields are closed to civilian traffic, operations officers permit the landing of contractors' planes when the proper arrangements have been made.

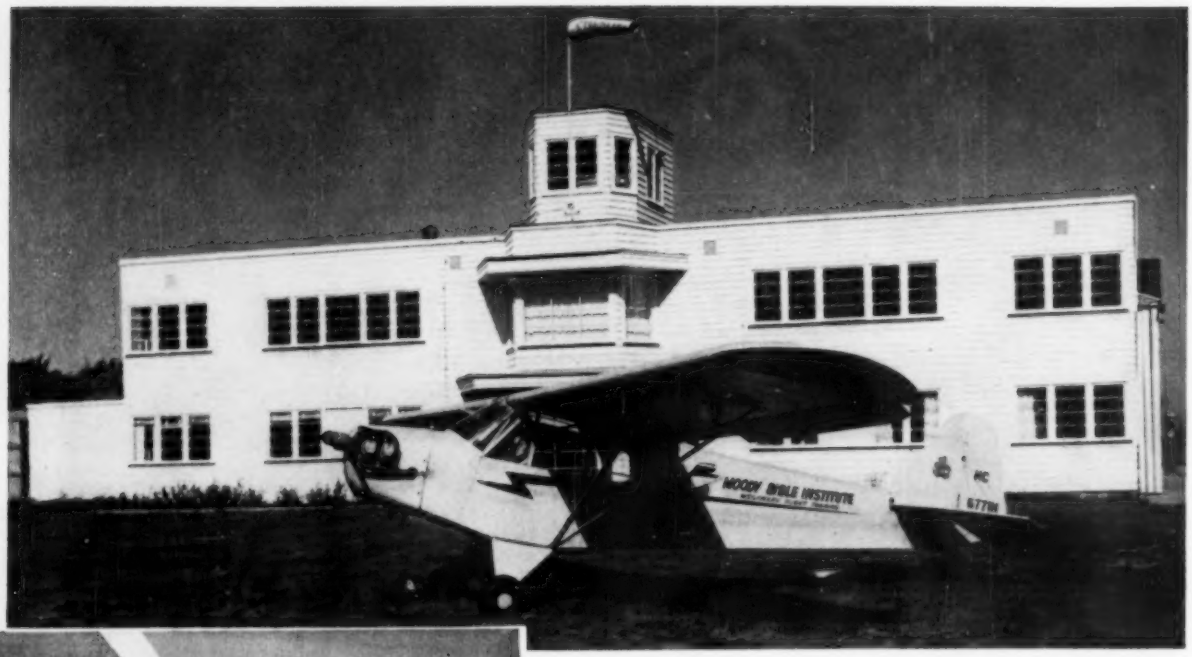
Our schedule this eventful morning was a routine flight to Laredo Air Force Base, 150 miles almost straight south to the Mexican Border. The terrain is the table-top variety. A busy highway leads the way, with an Omni station half way at Cotulla, and another at Laredo. It was a typical CAVU Texas morning when I asked the Tower for taxi instructions. The wind was northeast nine to 12 knots, and Runway Three was being used.

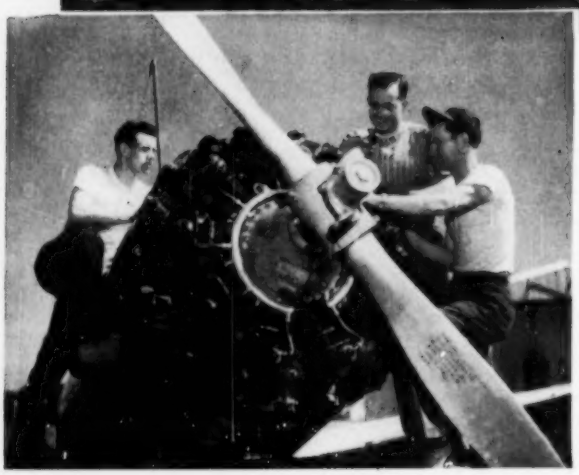
I know of no place in the country where a private pilot encounters more heavy aircraft than in the San Antonio area. Municipal Airport is very busy with airline traffic, plus the many private contractors transporting military personnel. We have B-29's, with a training program at Randolph Field, B-36's and all other types in and out of Kelly Field, plus Brooks Field, Stinson Field and others. Turbulence of varying intensity is also routine, passing over and under this large equipment. As the B-29 boys must make a simulated instrument run at the end of each mission, a pass at our Municipal Airport is a continuous procedure. Runway Three is the strip that is used. I might mention, at this point, that Runway Three is 5,300 feet long.

The engine on our new Cessna 195 warmed up on the yellow stripe at the end of Runway Three. I checked incoming traffic visually before calling the tower. This habit is a carry-over from years of flying sans radio. I observed a B-29, about a half mile out, coming in on a low approach. I delayed calling the tower until he was well down the field. Incidentally, I will put our San Antonio tower boys, plus one girl, up against any in the south, and I work most of them, for fast, courteous accurate information. I was advised that the B-29 had just made a pass at the field, and I was cleared for immediate take-off. Pulling out on the runway, I observed that the B-29 was well off the end of the field, over a mile away.

I started a normal run. When we reached about 10 feet, we didn't hit turbulence, we just ran out of air! We abruptly lost all lift. The right wing dropped. The distance we fell was such that I had the correction in when we hit. The crash to the concrete was severe, but only later did I realize how hard we must have hit. Cessna's spring steel type landing gear undoubtedly saved our goose from being cooked. (This is not a plug, just a statement of fact.) Despite the fact that our right wing-tip dragged the pavement, scraping the position light, (*Continued on page* 42)

The author wears a happy smile as he stands, unharmed, next to the Cessna after it had been bounced to earth, then skyward, in the propwash of a B-29. Note damaged door and twisted wheel strut minus wheel.





The Piper *Cub* above, shown in front of the administration building at Wooddale Airport, is one of the Moody Bible Institute's nine light training planes. *At left,* MBI students delve into aircraft maintenance.

THE AIR AGE AT WORK

This is the fifth
in a continuing series
illustrating aircraft at work.

WINGS for the GOSPEL

By IRVING PETITE

THERE is at least one aviation school in the country today with more applicants than it can handle. It's the Missionary Aviation Course of the Moody Bible Institute, famed interdenominational center of learning in Chicago.

Missionary students travel from all parts of the world to enroll in the MBI Aviation Course, then return to the distant corners of the earth qualified to put the airplane to work as a modern missionary tool.

Paul Robinson, former Baptist pastor and a pilot with an instructor's rating, introduced the idea for an aviation course to Moody's board of trustees in 1946. The trustees, progressive middiewestern businessmen, liked the idea, and one of their number personally purchased the first two training planes.

With Robinson serving as ground and flight instructor as well as supervisor of hangar construction, the program was launched in June, 1946. From its one-instructor, three-student beginning, it has developed into an established branch of Moody's Missionary Technical Course, with a full staff of instructors, nine training planes and more than 40 students.

More than 50 missionaries have already graduated from the Institute's flying school. For some of these, especially those assigned to South America, aviation is a full-time adjunct to their work. With the help of the airplane they are "revolutionizing" the missionary programs in their areas. For others in the field, flying skill is only occasionally used.

The Institute's first hangar, at Elmhurst, Ill., airport, was a quonset hut with an office, a classroom and room for four planes. The school was established with an original outlay of $10,000.

On August 1, 1950, the Aviation School moved to its present site at Wooddale, Ill., 23 miles from the Moody

headquarters in Chicago and four miles north of the Elmhurst site. Facilities include hangar, shop, classrooms, projection rooms, ready rooms and office.

The airport at Wooddale is small, with runways 1,800 feet and 2,600 feet in length. The field is rolling, which is desirable for the type of training offered. The school is fully approved by the CAA as a ground, primary and commercial, flight instructor, instrument flying and A&E school.

Admission to the Aviation School is limited to about 12 men each year. A typical starting class numbers among its members a few ex-military flyers with thousands of hours in heavy planes, a few private pilots, and some who have never flown before. Each must have an intense desire to be a missionary and a background compatible with technical training in store.

The Missionary Technical Course covers four years—there is no shorter course. For two years the principal studies are Bible and missionary subjects, plus an introduction to flight, radio communications, and still and movie photography. Each student gets about 75 hours of flying during those first two years.

The last two years are devoted entirely to advanced flying and radio, and carry the student through his commercial pilot's rating. Seaplane ratings are earned, too, with seaplane training given at Chicago Seaplane Base.

Jungle survival, rough field technique and aerial survey are among the special subjects covered by the course, and navigation receives particular emphasis in view of the jungle or Arctic areas over which the missionaries may later fly. Instrument flight training is offered in the school's Link trainer. Each student averages 300-350 hours of flying time and about the same number of hours in ground school.

The Institute's A&E course is one of the few "combined" courses currently being conducted anywhere. MBI is approved to offer work leading to both CAA and A&E licenses in about 10 months, instead of the 12-18 months required by the schools where these licenses are obtained separately.

"We feel the missionary pilot should be a better than average commercial pilot, who can not only fly and maintain his own equipment but manage and operate a flying service and be his own communications and weather man," says Paul Wertheimer, a Moody instructor. Wertheimer, who began flying in 1929, is himself a commercial pilot, flight instructor, CAA flight instructor and examiner, ground instructor, control tower operator and weather observer.

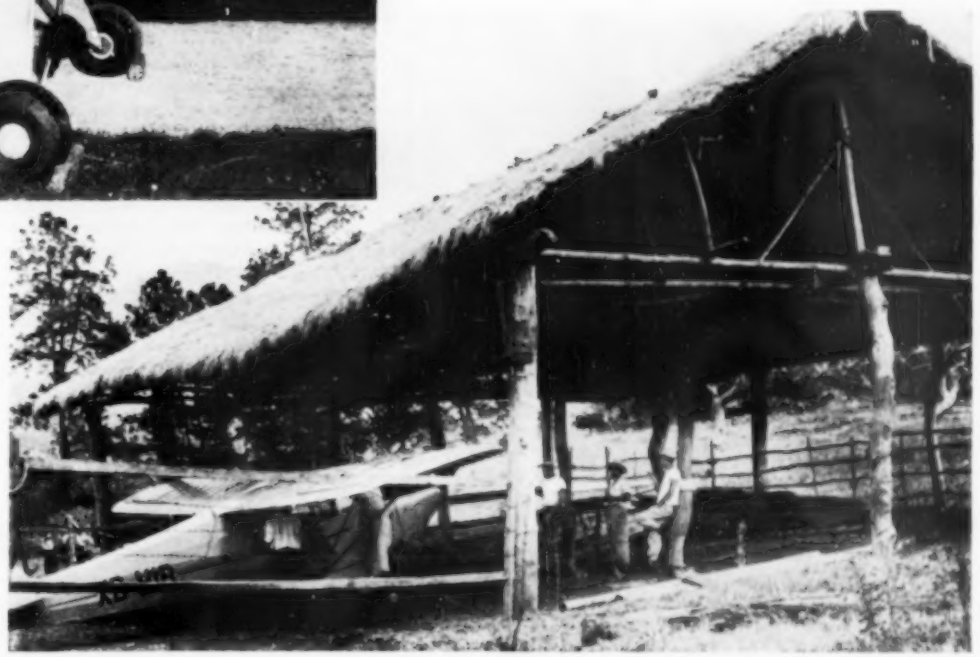
First flying missionary to graduate from Moody was Frank Mathis. He was sent first to the jungles of southern Mexico, then to Peru where he is currently stationed.

A final word is in order on the costs of flight training at the Moody Institute. There is no tuition at Moody. Expenses include board and room and, for flight training:

Private pilot course	
50 hours flying, per hour	$4
Commercial pilot course	
150 hours flying, per hour	$4
50 hours flying, per hour	$8
Seaplane training, per hour	$8
Aircraft maintenance and repair	
Shop fee, per semester	$25
Tools, approximately	$50

Such rates may, in part, account for the long and ever-increasing waiting list of prospective applicants for MBI's Missionary Aviation Course. END

Above, Rev. Paul Robinson, originator of the aviation program at Moody, checks a chart with Frank Mathis, first graduate of the MBI Missionary Aviation Course, who is now spreading the gospel in the jungles of Peru



At right, a homemade hangar in the interior of South America, a thatched roof and a lightplane—valued tools of the missionary who graduates from MBI

1 Glaze ice forms on vertical fin and outboard stabilizer during flight, while heated portion of stabilizer remains free from icing.

2 Front window of a DC-3 airliner, photographed after it landed at Seattle one January night.

3 Rime ice formation on B-17 radio antenna could increase drag to point of antenna failure.

4 An ice formation builds up on the unheated leading edge of the engine cowling of a C-46.

By WILLIAM A. DIXON

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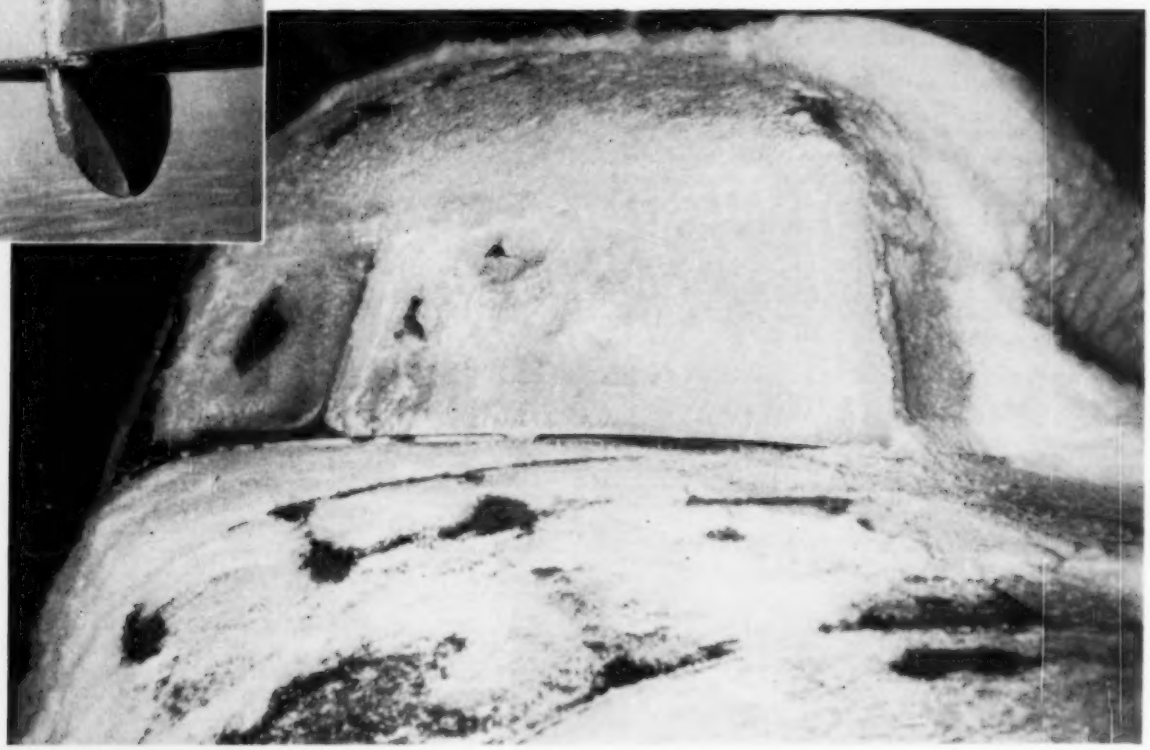

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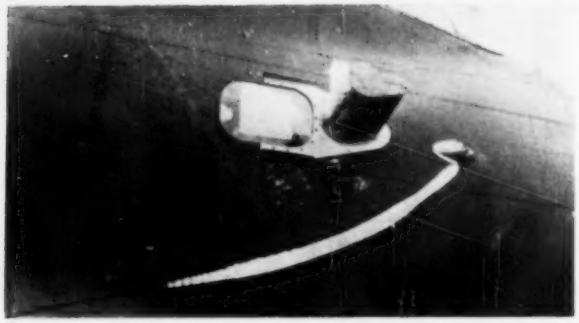

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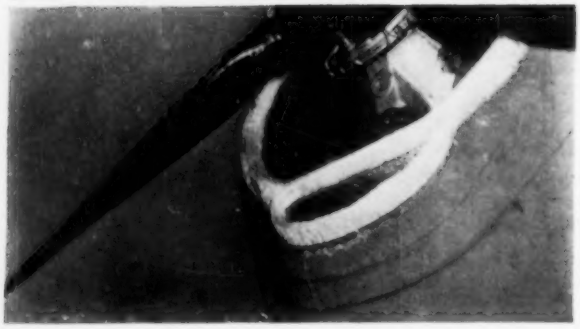


IT'S a toss-up as to which is the "Big Meanie"—summer's thunderstorm or winter's ice. Some pilots contend winter flying is more exacting while others maintain that nothing compares with summer's haymakers.

In this *unpopularity* contest, I cast my vote for winter! There's nothing with more bounce than a hairy-chested thunderstorm, but summer flying in general is more routine than winter. The cold months can bring on low ceilings and frontal systems that blot out the sun for hundreds of miles and days on end.

Each winter, each front, each storm is a little different. However the same basic rules apply when it comes to flying this stuff. No matter how long you've been pushing a plane around, there is so much you should know on so many subjects that a brief memory refresher every so often is a must. Icing is no exception.

A pilot must anticipate and be prepared for icing whenever moisture is present in visible form and the temperature is below freezing. For carburetor icing, visible moisture is not necessary—only sufficient humidity. Icing is just that simple!

Temperature is the key factor in any icing situation. Ice thrives most readily and is generally of glaze type at 30° to 25° F. It can appear at temperatures of 32° to 34° from evaporational cooling induced by the

Any season produces its share

of weather problems,

but to this pilot

WINTER IS THE WORST

They're doing something about the weather in the NACA laboratories. Here a technician in Arctic gear observes icing rate in Icing Research Tunnel.

plane's movement through the air. My experience in some 7,000 hours of flying has been that ice formed at this slightly plus temperature generally accrues irregularly, is light and rimy and of no great concern. If the air is unstable, it will build up a bit more.

If you are cruising along in a lightplane with no deicing or anti-icing equipment, you had best know if you are heading into lower temperatures, or if the terrain is going to force you to higher and consequently colder altitude.

Ice, tricky invader that it is, has been known to creep over the top surface of a wing when the temperature is just above 32°, with high moisture content (also favorable for carburetor ice) in the atmosphere. This is more serious because of its insidious nature. Ice may not be visible on the leading edge of the wing, except perhaps a ribbon, yet warning will come in a dropping off of airspeed while everything else appears normal. The pressure drop over the wing, and resulting expansional cooling of the air flow across the wing, lowers the temperature the necessary degree or two to collect ice.

I vividly remember one night on a flight over the North Atlantic. We were skimming along in the soup, temperature hovering slightly above freezing and just a trace of ice on the windshield wiper blade, but none apparently on the wings. It was pitch dark. Almost imperceptibly we started losing airspeed on the *Constellation* until it had dropped off about 20 mph indicated. Manifold pressure and other engine instruments were normal. We had had a light flow of alcohol on the props but had turned it off when the temperature came up. Our speed loss lasted about 25 minutes. We climbed 2,000 feet when we first noticed the reduced speed. What happened? Possibly we hit a spot in the atmosphere just right for wing ice of the type mentioned above.

With the most critical temperature range from 30° to 25° F., icing drops off rapidly below 25°. Unless you get boxed in by a supercooled water condition, which requires frontal or other type lifting to support the closely packed, large water droplets, there is little icing of consequence below —20° F. There have been reported occurrences, however, at temperatures as low as —40° F. in unstable air. Mostly, you encounter only ice crystals at the high altitudes which boast such frigid weather.

A good rule of thumb for winter flying is to scoot up fast through the clouds to a temperature of at least 15° F. Use extra power, not a steeper angle of attack. This works particularly well on the strato-cumulus and plain old stratus decks which envelop so much of the countryside during the winter, especially in the air mass weather behind cold fronts or where (*Continued on page* 48)

Maj. "Chuck" Yeager of the Air Force, first pilot to exceed the speed of sound, discusses operation of the Convair XF-92A with a mechanic prior to take-off. As a result of tests at Edwards, Convair has received contract to build the XF-102, fighter similar to the XF-92A

Mach over Mojave

Supersonics get their schooling at Edwards Air Force Base.

By HARRY LEVER

THOSE planes of fantastic, supersonic speeds you read about don't come into being overnight. Some of them, depending on their electronic personalities, undergo tests for as long as two years before they are accepted by the Air Force or Navy.

The most important of these trials are conducted at Edwards Air Force Base, near the California town of that name. Formerly Muroc, this is the location of the Air Force Flight Test Center, birthplace of aircraft which crack the sonic barrier.

Located in natural seclusion in the center of the Mojave Desert, Edwards probably has more air police and intelligence men than any area of similar size in the country. This rigid security is justified when you learn what goes on. Presumably there are planes and strange gadgets here that no outsider has ever seen.

Edwards is on the edge of Rogers Dry Lake—65 square miles of landing area. One runway is eight miles long. The lake is a drainage basin for the Mojave Desert, and winter rains resurface the lake bed, year after year. The lake's long runways are ideal for testing high speed jet and rocket aircraft.

The mission at Edwards is to flight-test supersonic aircraft, rigidly checking characteristics, power plants and components. Here, also, the research and development related to such tests goes on. Over-all jurisdiction is vested in the Air Research and Development Command, of which Edwards is one of nine centers. Its responsibility, in the long run, is to insure the Air Force planes and equipment not merely equal to, but surpassing those of the potential or actual enemy.

The secluded location of the AFFTC eliminates danger to the civilian population. This was a prime consideration of the Air Force in choosing a site in the center of a desert. The location also was favored because of its proximity to West Coast aircraft manufacturing firms. Good visibility and freedom from storms, both essential for prolonged flight-test work, can be counted on at Edwards. Thanks to the climate, tests can be conducted 350 days of the year.

Experimental aircraft undergo seven tests before they are accepted and put into production. The most important of these take place at Edwards. Elsewhere the airplane is tested, in some instances by the contractor, to determine whether it will function and whether it has deficiencies in design refinements, for its flying and handling characteristics under adverse conditions, and for its tactical suitability as to equipment, armament or other material.

The experimental supersonic airplane is brought to Edwards for its most rigid work-outs.

In one test here, the plane is flown from 20 to 50 hours to determine how it handles. An Air Force crew checks performance during this test with an eye to control characteristics, stability, and the manufacturer's guarantees, as well as the immediate or potential value of the plane to the Air Force. This test calls for a tight schedule of measured take-offs, landings, level flight, climbs and descents.

Another test at Edwards is applied to the first of a series of production airplanes. The airplane under-

Air Force hq recently placed the school at Edwards AFB in full control of training test pilots. *At left,* a pilot climbs aboard a Lockheed F-80 for a test flight.

Experimental aircraft are lined up for inspection at Edwards AFB. The planes, all of which have been flown, are: front to back, left to right, Douglas D-558-I; Douglas D-558-II (the aircraft holding the altitude record of 78,000' and speed of over 1,250 mph, flown by Bill Bridgeman); Bell X-5, with variable sweep wings; Convair XF-92A, and Northrop X-4. Planes have been flown at Edwards by pilots of the Air Force and NACA.

The Convair YB-60 lands at Edwards after a flight from Fort Worth, Texas.

Half dozen of the nation's leading test pilots, graduates of the Test Pilot School at Edwards, pose before planes they have tested. Pilots, left to right, are: Maj. Charles Yeager; Maj. Harold G. Russell; Col. Fred J. Ascani; Brig. Gen. J. Stanley Holtoner (commanding AFFTC); Lt. Col. Jack L. Ridley and Maj. Arthur Murray. Aircraft, left to right, front to back, are: Northrop X-4; Convair XF-92A; North American T-28; Lockheed F-80; Republic F-84F; North American F-86D; Northrop F-89; Lockheed F-94C; Boeing B-47; North American B-45; Boeing KC-97; Convair B-36.

A Convair B-36F gets the go-ahead for take-off from an Airways and Air Communications System (AACS) man at the AFFTC.

goes trials related to all its anticipated tactical uses, such as those requiring external tanks, rockets or bombs. This is a long test. The aircraft may have to fly up to 150 hours to pass. The results show in the dependability of ships now flying.

Some of the planes which have passed this particular test are the F-84C *Thunderjet*, the F-86E *Sabre*, the B-36 intercontinental bomber, the C-124A *Globemaster* II transport, and the L-20A de Havilland *Beaver* light transport in which the Air Force has expressed interest.

An experimental supersonic airplane is given the works in the AFFTC's most rigid trial. This test uses three of the first 10 production models for 150 hours flying time each. Various Air Force commands usually are invited to send flight crews and maintenance men to participate, since this test is also a training medium for the operation and maintenance of the new type aircraft.

In this test, they really "wring out" the new ship. They fly her at night, in all weather. Her maximum range is ascertained and simulated combat damage missions are flown. Flight crew and maintenance men note all defects. If defects exist, the aircraft manufacturer is notified so immediate corrective steps can be taken and further study ordered.

The Air Force project engineer, on being notified the flight tests are completed, prepares his report. He details inspection requirements, parts consumption and maintenance needs. The field commands use this report from the engineer at AFFTC to determine their operating requirements when the production airplane is received in numbers.

Flight characteristics of supersonic aircraft are not the only things tested at Edwards. For instance, there is a deceleration track, located on the northwest shore of the lake bed. It is 2,000 feet long, with a specially designed track-mounted friction brake 1,250 feet from the starting point of the straightway. This brake clasps two keels attached to the chassis of a rocket-propelled test sled and decelerates it to simulate forces received in aircraft crashes or ditchings. Tests conducted on this track have led to redesign of harnesses and aircraft seats. They also have provided information on the stress analysis of the human body. With this system, decelerations of from 10 to 50 G's can be applied.

There is a special high-speed track of another nature at Edwards. Operated by the Air Force, it is the world's fastest and straightest railway. Here, sleds weighing 3,000 pounds are propelled on a 10,000-foot track at speeds up to 1,500 mph, utilizing a battery of rockets which provides thrusts up to 100,000 pounds. Braking for the sleds is provided by water forced into a trough between the tracks at a speed of more than 500 mph.

Typical project runs on this high speed track include seat ejection, parachute deployment and tail flutter tests. Equipment tested is mounted on a sled which contains instruments capable of recording the required test data in a matter of seconds. Sometimes, they don't get (*Continued on page* 58)

Spring painting gets underway as a change of address is registered on the nose of a C-97 at the Air Force Flight Test Center.

Below, Capt. J. Slade Nash, AFFTC test pilot, stands beside the North American F-86D in which he set a 699.9 mph speed record.

Cutting the cost of private flying

Cheaper planes? Homemade kits? Flying clubs? Let's look at the ledger!

By FRANK H. HIGHLEY

WE HEAR it on all sides—the cry that private flying is losing its appeal to our youth because of the high cost of present day light airplanes. By way of reversing the trend, it has been suggested that the light aircraft manufacturers produce low-cost airplanes, equipped with a minimum of instruments and accessories. It has also been suggested that the aircraft manufacturers market airplanes in kit form, to be assembled by the purchaser.

It is very possible that these two methods might result in lower cost airplanes. It is doubtful, however, that they would result in lower flying cost. "Flying cost" —the total cost per hour of operation of an airplane— has only a remote relationship to the cost of the airplane.

The total cost of operating an airplane is the sum of many costs, some of them fixed annual costs and others hourly costs.

Fixed costs include such items as hangar rent, insurance, annual inspection and recertification, and depreciation. These must be paid whether the airplane is flown or not. Hourly costs include fuel, oil, engine maintenance and overhaul and maintenance of the airplane.

To understand how fixed costs and hourly costs affect the flying cost, let's take a typical example—a three-place light airplane with a 90 hp engine. The airplane is not new, so the figure for depreciation will not be high. Fixed costs—approximate, of course, but estimated on the low rather than the high side—are as follows:

Hangar Rent @ $20/mo.	$240/yr.
Liability and Property Damage Insurance	52/yr.
Inspections and Recertification	50/yr.
Depreciation	200/yr.
Total Annual Fixed Costs	$542/yr.
Hourly costs are as follows:	
Fuel 6½ gal./hr. @ $ .30/gal.	$1.95/hr.
Oil (Changes plus Additions @ $ .40/qt.	.16/hr.
Engine Maintainance (500 hr. overhaul @ $300)	.60/hr.
Aircraft Maintainance (estimated)	.50/hr.
Total hourly cost	$3.21/hr.

Government statistics show that airplanes engaged in personal pleasure flying are flown an average of only 60 hours per year. Using this average figure, let us combine the fixed and hourly costs for one year's operation.

Fixed Costs	$542
Hourly Costs	
60 hrs. @ $3.21/hr.	192.60
Total Annual Cost	$734.60

On an hourly basis the total flying cost then becomes $12.24/hr.—rather stiff for the average flyer to pay, or the prospective flyer to contemplate.

What can be done to bring this cost down to the range where more people can afford to fly? Obviously, the minimum cost possible is the hourly cost of $3.21, but this can be attained only by eliminating the fixed annual costs. Equally obvious is the fact that these fixed annual costs cannot be eliminated.

The figure for hangar rent is variable, according to the demand and availability of space. Twenty dollars per month is believed a fair average. Hangar rent could be eliminated entirely by parking the airplane outside, but to do so would increase the figure for depreciation, invite the possibility of damage or loss of the airplane due to wind and/or hail and increase the possibility of structural failure due to deterioration of the airplane.

The figure for insurance could be eliminated entirely, but to do so would place the owner in the position (in case of accident) of being forced to pay damages of, possibly, thousands of dollars. No one interested in low cost flying should run the risk of expensive damage suits by trying to eliminate the cost of insurance.

The figure for inspection and recertification might be reduced but cannot be eliminated. The inspection must be made by a certificated mechanic and a mechanic who does a good job of inspection will require time to perform the task and must be paid for his time. The practice of having a friendly A. & E. mechanic "sign off" an annual inspection for a small fee without doing more than taking the owner's word for it that the airplane is in airworthy condition is still too prevalent. Since this practice is conducive to aircraft accidents it should be avoided at all costs. (*Continued on page* 65)

Lieutenant Gallas

Accidents scoff at seniority

You've logged 5,100 hours?

It STILL could happen to you.

BY LT. EDWARD G. GALLAS, U.S.N.
AS TOLD TO
LT. (j.g.) MICHAEL A. DeCARLO, U.S.N.

GRAMPAW PETTIBONE, the old gentleman of Naval Aviation, said, "There are two kinds of pilots: the fueled and the fooled. The first arrive by airplane; the second arrive by parachute, raft, wheelbarrow, ambulance, stretcher or other conveyance. Occasionally they don't arrive at all." This is the story of a pilot who was fooled.

After completing two weeks of duty at the Naval Air Station, Guantanamo Bay, Cuba, I departed for my home base, the Naval Auxiliary Air Station, Chincoteague, Va., 1,240 miles away. Early morning saw me airborne for Miami in a twin-engine fighter, the F7F *Tigercat*, on a 500-on-top IFR clearance. A passenger bound for Norfolk rode along in the radar operator's compartment. The 440-mile trip from Guantanamo to Miami was uneventful; nothing to see but blue sky above and cloud blanket below.

At Miami I refueled and re-filed IFR for Hunter Air Force Base, Savannah, Ga. Thunderstorms harassed me most of the way; the turbulence tossed the plane about like a bobbing cork. From Hunter, I proceeded VFR to Chincoteague, intending to make a five-minute passenger stop at NAS Norfolk to release my passenger.

I had been flying almost six hours by the time I passed over Lake Drummond in the Dismal Swamp. The enervation born of flying instruments on the long solitary flight and listening to the static and engines vying for supremacy was beginning to tell on me. I stretched, yawned, and opened the canopy to revive myself.

Approaching Norfolk, I descended from 8,000 feet and automatically went over the check-off list. I landed, released my passenger, and taxied back to runway 04. I was in a hurry; 20 minutes away was home, my family, a refreshing shower, and a good meal. Quickly, I went over the check-off list, received clearance from the tower, and added take-off power.

As the plane left the deck, I retracted the landing gear and eased back the stick to climb. Suddenly, at 30 feet, both engines cut out completely! The manifold pressure needles did a back flip. The plane was sailing through the air, rapidly losing flying speed, and heading directly toward the seaplane hangar and Bachelor Officers' Quarters. The abrupt silence was electrifying. The tower began calling frantically. I hastily glanced at the fuel selector switch and fuel booster pump, and discovered that I had taken off on a droppable wingtank; since it had no fuel quantity gauge, I had unknowingly allowed it to run dry. Instantly, I switched to "reserve."

In an effort to prolong the seemingly inevitable crash, I had pulled the nose up to a near stalling attitude. Realizing that the right engine would cut in several seconds before the left, I now lowered the right wing to counteract the torque. Nothing happened. The hangar loomed before me. I braced myself for the impact. With a roar, the right engine caught, sputtered, caught again, and hurled the plane nose high in the air. The horizon passed through the perpendicular; the plane continued to roll on its back. Then the left engine caught, and rolled the plane violently back to an almost wing level and extremely nose high attitude. I pushed the nose over to level flight. My aircraft had cleared the hangar by a hair's breadth. Taking a deep breath, I settled down and proceeded safely into Chincoteague.

What seemed an eternity had really been a matter of seconds. I was fortunate to have escaped the consequences of a mistake that knows little or no forgiveness. Eleven years of flying, with over 5,100 accident-free hours, was nearly punctuated by disaster. The lessons that had been reiterated since I was a flight student had been permanently impressed upon me in those terrifying moments.

The lessons are these: In the first place, don't just look at the check-off list. Read it, and check each item by actually handling the controls and switches. It is easy to skip an item when you are weary from long hours in the cockpit. Check everything twice. One item on the *Tigercat* check-off list is to switch to "reserve" for take-offs and landings. I failed to switch to "reserve" for landing; thinking that I had, I did not check it before take-off.

Secondly, be thoroughly familiar with your aircraft. Knowing all its peculiarities can save your neck when the chips are down. Being aware that the right engine of the *Tigercat* would catch first probably saved my life.

Thirdly, don't let years of flying without mishap make you over-confident and careless; be more cautious than ever. The tendency is to take your ability and "know how" for granted.

Mistakes don't recognize seniority. END

CLEVELAND This Lake Erie city, with a population of one million, has an air strip minutes away from the business district and the home stadium of the Cleveland Indians. Ashes and rubbish dumped in Lake Erie provided land.

Lake-front Air Strips

MILWAUKEE An air view of downtown Milwaukee shows the proximity of Maitland Field, bordering Lake Michigan in the background. Ten "T" hangars have permanent tenants and there's a hard-surface runway 2,900' in length.

CHICAGO Meigs Field, Chicago, is 10 minutes by bus from the Loop. Field handled over 32,000 flights in and out last year, including DC-3's and C-46's. Strip specializes in service and attracts many business aircraft.

Three Great Lakes cities have solved the problem of the handy, downtown airport.

By GEORGE R. REISS

AVIATION'S number one crying need, some folks feel, isn't really the roadable airplane, free flight training, or even two helicopters in every garage—but just a lot of handy, simple and inexpensive downtown air strips in the big cities, handy to the places where people work, eat, and play.

These would give present-day aircraft the utility that would make them even more handy than roadable aircraft or helicopters, with all their shortcomings.

Give the country plenty of downtown air strips and the chances are that aviation, particularly business aviation, will get one of its biggest shots in the arm, greater even than the CPT program or G.I. flight training. This is already being proved quite handily in Cleveland, Chicago, and Milwaukee, three cities with close-in, lake-front air fields. There are others, of course, but these are conspicuous examples.

There's nothing pretentious or spectacular about these two-way strips, mind you—but they're all close to the main business districts, making it convenient for the flying man to drop in with his airplane, transact some business, prowl through the stores, or take in a lunch and a show, without fighting big city highway traffic or wasting too much time.

The rub is that so few other cities have such handy strips—as a result the lake-front strips of Cleveland, Milwaukee and Chicago are losing some of their potential usefulness. There aren't enough flying fellows around yet.

Of course, these three cities have an edge on some cities in finding spots for their downtown air fields. All three are on lake shores (Cleveland on Lake Erie and the other two on Lake Michigan). As a result there are wide open spaces, with unlimited approaches, near the business districts.

Actually most other large cities, by using a bit of imagination, could do the trick, too. Most have some unused spots—an abandoned industrial plant site, or an unused strip bordering a major highway or boulevard, a park area along a river. All you need are 2,500 to 3,000 feet of level area—and fair approaches.

Sure, this may not make the ideal all-weather airport. The lake-front fields at Cleveland, Milwaukee or Chicago aren't all-weather fields, either. But they've a lot of utility during those 75 or 80 or 90 per cent of daylight hours when VFR conditions prevail. At other times folks may leave their planes on the ground or use the major outlying airports.

Cleveland generally is credited with pioneering the lake-front air field idea. A city of 1,000,000, Cleveland for over a century had steamship service to Detroit, with steamers tying up at its East Ninth Street piers. About 25 years ago, an amphibian airline was started, its planes landing in the Detroit River and in Lake Erie at Cleveland, tying up alongside the steamers with which they competed. That called attention to the convenience of downtown air service.

The city built a small downtown airfield on a bit of unused lake-front land about 20 years ago. It was premature. Needing a site for its Great Lakes Exposition, Cleveland appropriated the airfield; later it used the land for a municipal stadium. Then a four lane superhighway was built along the lake shore. That left no room for re-establishing the lake-front air field.

Major John Berry, Cleveland (*Continued on page* 64)

Army aviators receive instruction in how to pack supplies and attach them to the bomb shackles underneath the wings of the L-19 aircraft.

The L-19 carries 500 lbs. of supplies neatly stowed under its wings.

It's the new Army game

—this technique of flying

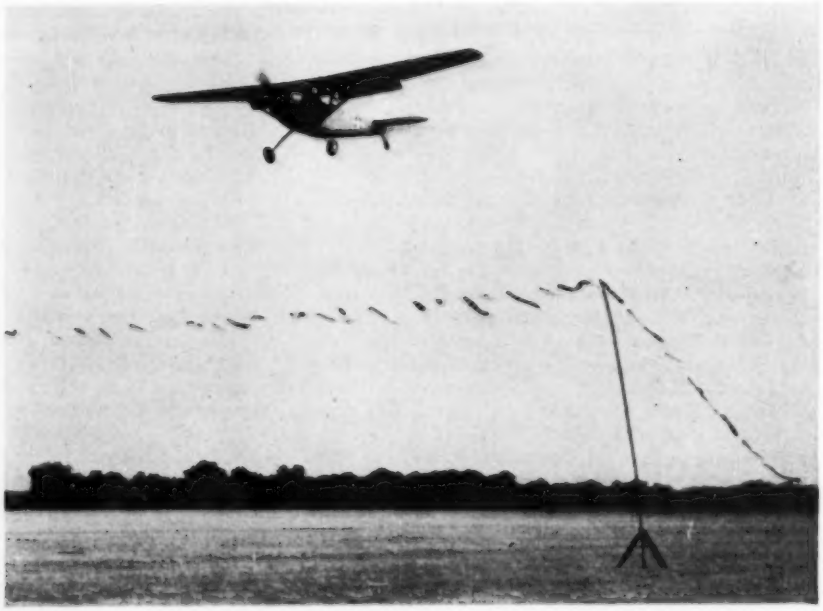
LOW AND

ACCORDING to an old saying, there is the right way, the wrong way, and the Army way. This certainly applies to Army flying.

At Fort Sill, Okla., Army aviators consider impossible flying routine. Daily, in their tactical aviation training, they break the oldest commandments of the air. They fly low, often below 500 feet, and slow, clearing the tops of trees or rocky mountain cliffs by scant feet with the airspeed so low that a stall warning horn, if there were one, would be a continuous siren.

Give an Army airman a 500-foot strip of cow pasture and he will put on an air show that makes the barnstormers of the '20s shake their heads in disbelief. At the bat of an eye, and a thousand feet of altitude, he will half roll his L-19, pull the stick back and do a headlong plunge to treetop level where he levels off and goes skittering between hills like an airborne jeep. Dangerous? Not for an Army aviator.

To make possible this type of flying the Army has brought together a most unusual airplane and a unique type of flight training. The airplane is a two-place, high wing aircraft built by Cessna—first cousin of the civilian Cessna 170. It has a 213 hp engine that makes it climb like a space ship. It can easily do the proverbial 10 cent turn and hand you nine cents change. Its high rate of climb, slow rate of descent, and excellent maneuverability enable it to get in and out of short strips and evade enemy aircraft. Couple these qualifications with its metal construction, rugged enough to withstand



An L-19 comes in slow for a landing over a cord barrier 15 feet high.

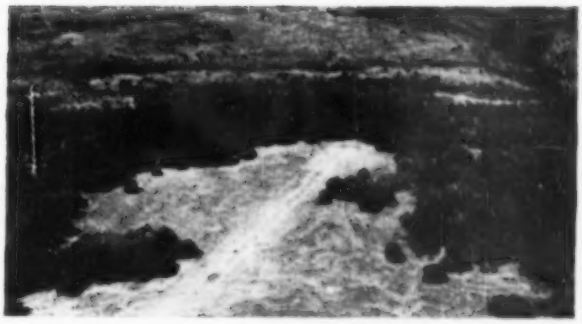
weather and rough landing strips, and you have a front line plane.

The flight training which the Army conducts for the pilots of these rugged little planes is rigid. An applicant must be in excellent physical condition to qualify, since he must pass the physical examination given Air Force cadets. He must also be a commissioned officer in the United States Army.

Flight training begins at San Marcos Air Force Base, Texas, where the Air Force operates a primary flying school for Army aviators, using L-21 type aircraft. Many of the applicants are ex-Air Force and Navy pilots or men with several hundred hours of civilian time who hold CAA commercial or private licenses. The majority are Army officers who have only ridden in airplanes as passengers. Some few have never before been in an airplane.

Regardless of how much experience an officer has had, upon his arival at San Marcos he is treated as an individual with no previous flying time. The fact that he knows how to fly the aircraft of the Air Force or Navy, or has civilian time, does not mean that he knows how to fly the Army way. An officer with flying experience finds it easier in the beginning when the class is receiving basic flight fundamentals, but difficult to keep up without hard work after his class has logged about 60 hours in the air.

In addition to flying, the Army aviation student daily attends four hours of ground (*Continued on page* 55)



Air strips to test the precision of Army flyers are cut out of the woods, on a hillside or just a dirt road and are 600'-1,200' long.

A free drop from 10 to 20 ft. is made with food, mail and clothing.

By WEYMAN S. CARVER
Captain, United States Army

SLOW

At this point, the Army student is low and slow over a real barrier.

Operational Altitude

Then there was the pilot

who tried to take off

when operational altitude exceeded

his plane's service ceiling.

Could it happen to you?

By HARALD H. PROMMEL

The chart below determines your operational altitude, which is the calculated altitude of the air at which the airplane is flown, regardless of field elevation above sea level.

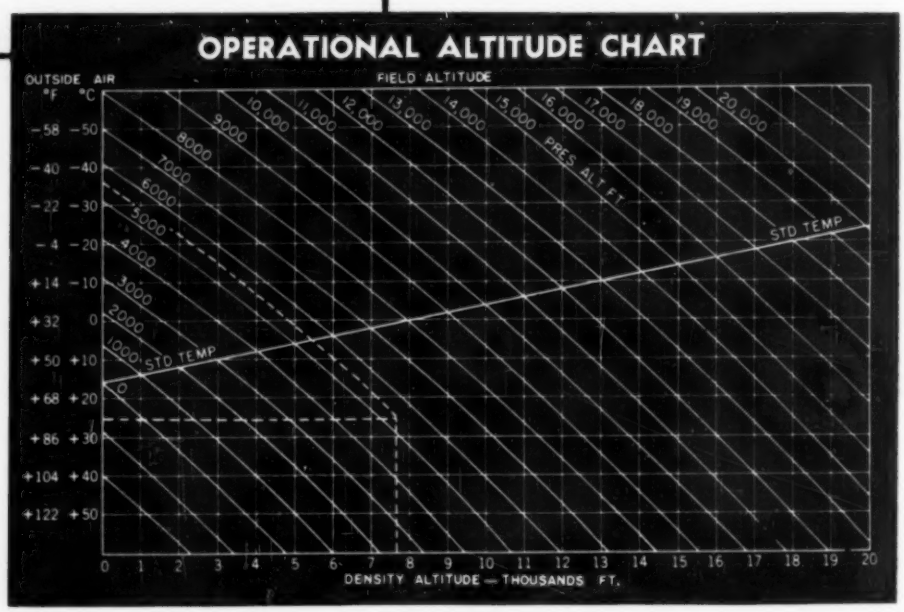
It is generally used in flight to compute conditions at any airport into which you intend to fly. To use the chart, field altitude and temperature must be known. Field altitude can be taken directly from your flight sectional chart. Request field temperature by radio from the airport you intend using, or from a nearby radio controlled field if your intended airport has no radio facilities.

The following example illustrates the simple use of the chart:

Enter the actual altitude of the airport to be used on the diagonal lines marked "Field Altitude." (Example: 5,500 feet.) Next, enter the temperature line to the right until it crosses the diagonal line (Field Altitude). From the point where these two lines intersect, drop a straight line to the bottom of the chart and observe the operational altitude. (Example: 7,700 feet.)

NOTE: To eliminate confusion, barometic pressure has not been included in the chart. Therefore, the resulting answer is close to, but not quite, the true operational, or density, altitude. The figure will be so nearly correct, however, that the chart can be used safely under visual flight conditions to eliminate any possibility of exceeding the limitations of your airplane.

True operational, or density, altitude can be found by simply entering pressure altitude instead of field altitude on the diagonal lines.



This chart measures the effects of operational altitude in terms of decreased flight performance. From it, you can determine the distance you will have to increase your take-off run and also how many feet-per-minute your normal rate-of-climb has decreased.

It is generally used prior to take-off and is important because it tells you whether it is safe, or even possible, to take off under existing pressure, temperature and density conditions.

To use the chart, pressure altitude and field temperature must be known. Pressure altitude can be determined by setting your altimeter barometric scale to a normal pressure of 29.92. A reading of the altimeter then gives you pressure altitude. Be sure that your ground temperature reading is in degrees Fahrenheit, or that you convert any Centigrade reading prior to entering it on the chart.

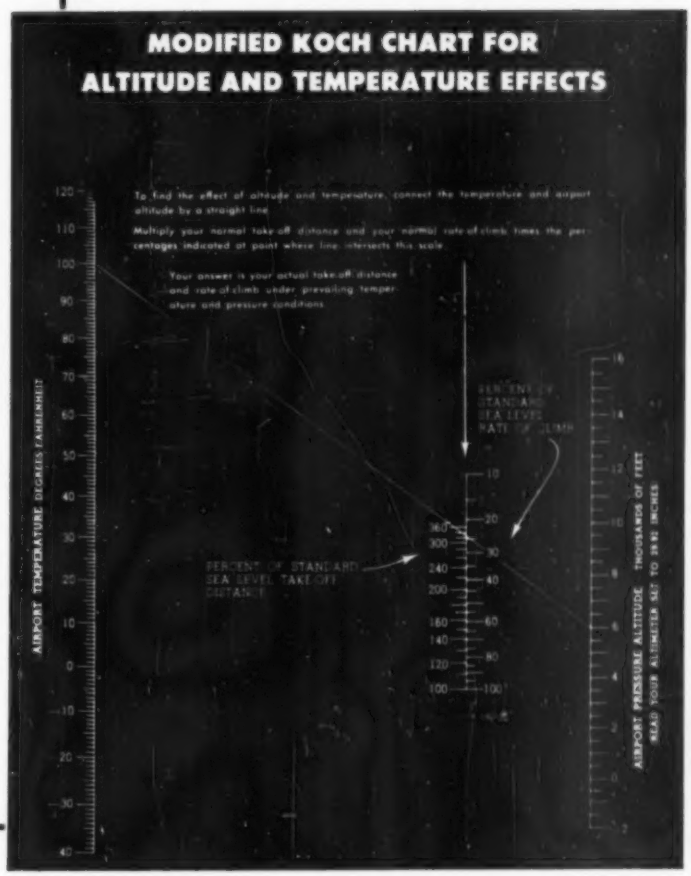
The following example illustrates the simple use of this chart:

Assume a temperature of 100° and a pressure altitude of 6,000 feet. Connect the two readings by a line. (See example diagonal line in chart.) The point at which this line crosses the take-off and rate-of-climb scale gives you your per cent of standard take-off distance and your per cent of standard sea level rate-of-climb.

In the example, the take-off run must be increased to a distance amounting to 330 per cent of the normal sea level run, while the rate-of-climb has decreased to only 24 per cent of the normal sea level rate-of-climb. An airplane requiring 1,000 feet at sea level to take off and climb 50 feet would require 3,300 feet under these conditions. If its normal sea level rate-of-climb were 500 feet-per-minute, the airplane could only climb 120 feet-per-minute.

To use the chart, you must know the normal sea level performance figures for your airplane in order to apply the percentages determined from the chart. They can be found in the airplane operating manual supplied by the manufacturer.

Also remember—long grass, sand, mud or deep snow can easily double your take-off distance, so plan accordingly.


MODIFIED KOCH CHART FOR
ALTITUDE AND TEMPERATURE EFFECTS
To find the effect of altitude and temperature, connect the temperature and airport altitude by a straight line
Multiply your normal take-off distance and your normal rate of climb times the percentages indicated at point where line intersects this scale
Your answer is your actual take-off distance and rate of climb under prevailing temperature and pressure conditions
AIRPORT TEMPERATURE DEGREES FAHRENHEIT
PERCENT OF STANDARD SEA LEVEL TAKE OFF DISTANCE
PERCENT OF STANDARD SEA LEVEL RATE OF CLIMB
AIRPORT PRESSURE ALTITUDE THOUSANDS OF FEET
READ YOUR ALTIMETER SET TO 29.92 INCHES

WHAT is operational altitude?

If you don't know, you'd be wise to study carefully the charts appearing on these pages.

Why?

Because they'll keep you out of trouble—possibly even save your life.

Unless you are thoroughly familiar with operational altitude, you might attempt a take-off some summer afternoon without realizing that it is a physical impossibility. Under these conditions, you're apt to end up in the fence or the power lines.

To understand and have the proper respect for operational altitude, you must first understand that increase in altitude, even under normal pressure and temperature conditions, lowers the performance characteristics of any plane.

Assume that your airplane takes off at sea level after a 500-foot run under conditions of normal pressure (29.92 inches of mercury) and normal temperature (59° F.).

Now, take the same airplane off at an airport of 5,000 feet elevation, again under normal pressure and temperature conditions as they would be at 5,000 feet (pressure, 24.89, temperature, 41.2° F.).

What happens? You find you need to increase your take-off run to approximately 830 feet, and once in the air you can only achieve about 55 per cent of your standard sea level rate-of-climb.

Why? Because at 5,000 feet the air is thinner—less dense—than at sea level. You therefore need more speed to achieve the lift necessary to get the airplane off the ground, and a longer take-off run to achieve that speed.

The same applies to rate-of-climb. Because the air is thinner, you need to move faster through it to maintain the same rate-of-climb as at sea level. If you climb out of the 5,000-foot field at a normal speed, you lose some of the lift you had at sea level, and the rate-of-climb decreases accordingly.

So it is that even under normal temperature and pressure conditions the flight characteristics of an airplane are changed by altitude increases—more space is needed to land, takeoff and climb out.

Where does operational altitude fit into this?

Notice in the example above that we dealt with *normal* pressure and temperature at both sea level and 5,000 feet. Actually, temperature and pressure changes seldom remain constant with altitude changes. In other words, they are *not normal*—they are higher or lower than normal, and as such they cause *additional* decreases in and airplane's performance. (*Continued on page* 57)

FLAT SPIN

Certain theoretical truths are better accepted than tested.

By JOHN A. KENT

SOME years before the start of World War II, while undergoing training with the Royal Air Force, I was detailed to carry out some practice flying in a Hawker *Fury*, a small bi-plane fighter with which a few squadrons were equipped at that time. After completing the maneuvers I had been ordered to carry out I found that I still had some time in hand before I was due to return to the airfield. I decided to check on the accuracy of some of the statements made by the officer who lectured to us on Aerodynamics.

One of the points the lecturer had made was that during a spin—say to the left—if the stick were moved to the right, or "out" of the spin, the speed of rotation would increase owing to the increased drag on the inside wing. Conversely, if the stick were moved to the left, or "into" the spin, the speed of rotation would decrease owing to the increased drag on the outside wing. Although I was quite ready to accept this as theoretically true, I doubted whether, in fact, the effect was sufficient to be noticeable to the pilot in the airplane. I determined to find out for myself.

Climbing the little airplane to 18,000 feet, I kicked it into a spin to the left and, after a few turns, I moved the stick "out" of the spin and was quite surprised to find that there was an appreciable increase in the speed of rotation. That point proved to my satisfaction, I held the airplane in the spin and moved the stick to the left, or "into" the spin. I was again surprised to find that the airplane spun more slowly and, in addition, the nose started to come up onto the horizon. This latter development was unexpected and rather intrigued me, so I let the aircraft continue for about three turns before taking recovery action.

It was at this point that I received a further surprise. The controls seemed to have become disconnected and had no effect at all and I could feel very little resistance to their movement. I next noticed that the nose of the airplane was practically on the horizon and, although the speed of rotation had dropped, the aircraft was beginning to describe an odd whipping motion quite unlike anything I had ever experienced.

I tried everything I could think of to make the aircraft recover, but without success. I moved the stick right forward then back, at the same time opening and shutting the throttle. Finally, in desperation, I "stirred" the stick around the cockpit, kicked the rudder from side to side and opened and shut the throttle—still to no avail!

At this time I began to become uncomfortably aware of the ground, which had seemed so far away at 18,000 feet. I glanced hastily at the altimeter, and with a shock found that I was down to 5,000 feet. There was nothing for it—I had to get out, so I undid my safety harness and, with an effort, reached up and grabbed the hand holds in the trailing edge of the center section of the top wing. I found it quite difficult to pull myself up but at last I managed it. I don't know quite how far I got before the airplane suddenly stopped spinning and with a violent lurch pitched its nose down, throwing me out of the cockpit. I was still hanging onto the center section and my feet had caught on something, probably the instrument panel. Otherwise I was sprawled over the top of the center section.

I have a very vivid recollection of looking straight down over the top of the wing at shipping in the river, over which I happened to be, and it looked horribly close. Suddenly the airplane pulled itself out of its dive and threw me back into the (*Continued on page* 50)

Rainmaker to Industry

Big Business, wed to water power, is the best customer of the new rainmaking science.

By ARTHUR F. JOY

Top photo shows silver iodide crystals being loaded aboard plane on northern Canadian lake for transfer to rainmaking locale. Below, operators fire generators for seeding clouds.

Dr. Wallace Howell

THE science of "making rain", although only six years old, shows promise of stabilizing the economic life of any industry which depends upon a constant water supply.

Industry today has under contract a "rain maker" about whom it is very happy. This young scientist, 39-year-old Dr. Wallace Howell of Cambridge, Mass., heads an organization bearing his name.

Dr. Howell grew up with the science of cloud precipitation while in charge of Mt. Washington Observatory in New Hampshire. It was there that other rain-making scientists, notably Drs. Irving Langmuir and Vincent Schaefer of General Electric's laboratory staff, came to prove their theories of the physical effects of cloud seeding. Dr. Schaefer, a skiing enthusiast who puzzled over the origin of snowflakes, induced a miniature snowstorm in a deep freezer at his home by using a cake of dry ice to trigger the same reaction which Dr. Howell had observed happening naturally in cloud formations over Mt. Washington.

When Schaefer duplicated his home freezer snowstorm within a full-sized natural cloud, scientific rainfall stimulation was born. In the six years since, each of these scientists, Langmuir, Howell and Schaefer, has come a long way.

So intense was Dr. Howell's enthusiasm for the new science that when New York City officials in 1950 appealed for someone to fill their dried reservoirs, Langmuir at GE recommended the young observatory head.

For $100 a day, Howell undertook to get New Yorkers back into the bathing and shaving groove. That spring, he succeeded in filling the emptied reservoirs. There was, however, so much howling from mountain resort owners and sweet corn growers that the rainmaker vowed it would be a long time before he got caught again in his own rain between irate farmers and resort owners.

Instead, Howell went after Business. He has recently renewed contracts for rain stimulation programs with Aluminum Company of Canada and other large hydroelectric, mining, and pulp and paper concerns in the United States, Canada and South America.

In Canada, in the Lake St. John drainage area, Howell's rainfall stimulation program has brought so much rain to natural reservoirs that Aluminum Company of Canada did not hesitate to renew its contract for a two-year period.

"Waterpower", says Howell, "is why Alcan is in Canada. Right now they are building a gigantic plant in British Columbia—much larger than present plant space up there. This new plant is located in the middle of nowhere. Why? Simply because there is a wealth of water all about."

And Howell Associates are under contract to see that the water supply remains constant for Alcan operations. Ample water power means cheap electricity, which in turn means aluminum at a low price. Alcan's supply of bauxite comes all the way from Jamaica—which gives an idea of the relative importance of water availability and the raw material source.

With Alcan's contract renewal, Howell Associates have themselves gone into considerable expansion in Canada, hoping, before they are through, to attract other industries there. Currently, they are setting up a radio communications network in the vastness of the wild country —up past the thin belt of civilization, almost to the Arctic Circle.

"Here, we are using FM radio equipment and 'bush' workers to gain our objective," (*Continued on page 62*)

The medics pool the results of their research, and come up with a cheering word for the not-so-young pilot.

Can Grandpa Fly?

By ED HOADLEY

WHAT is the age at which human beings become undependable pilots? Or is there a measurable age and, if so, how is it determined?

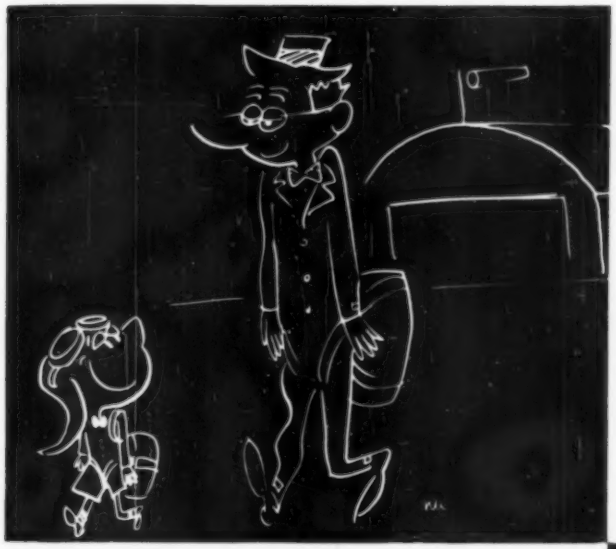
CAA records reveal a plentiful sprinkling of men and women who have learned to fly after the age of 50 and even a greater number who, having learned in earlier years, continue to renew their licenses into the 60's and 70's.

I asked Dr. W. R. Stovall, Chief of the CAA Medical Division, for his viewpoint. He replied, "A man is no older than his arteries . . . that is, a man is no older than his physiological age."

The Air Force Aviation School of Medicine, at Randolph Air Force Base, thinks there is a point at which experience, judgment and skill in piloting can no longer compensate for physiological and psychological changes due to age. But where is that point? That's what they want to determine.

An airline medico judges that the normal age limits of piloting depend upon the kind of flying to be done. For extensive military flying the average cut-off age is around 45 years. On the other hand an airline pilot at 45 is probably at the peak of his activity as far as essential experience, judgment and skill are concerned.

The consensus appears to be that flying can roughly be divided into three main categories . . . military . . . commercial . . . and personal. The age brackets of the military airman lie between 18 and 45; those of the airline pilot between 18 and 65; and those of the



private pilot between 16 and 75. Of course there are numerous exceptions to this bracketing.

Researchers are interested in obtaining yardsticks by which pilot capability can be scientifically measured for all classifications. How can physiological and psychological factors be added up? If this were pegged with greater accuracy we could know what devices and aids would stretch the age span of the various groups.

From a physiological viewpoint the heart can be said to be the mainspring of the pilot. Dr. S. E. Smith of the CAA Medical Division has specialized along this line. Using two basic developments—the electrocardiograph and the ballistocardiograph—he has been seeking to determine probability patterns of heart impairments of one kind or another.

Another basic research is conducted by Dr. C. R. Spealman, Chief of CAA's Safety Projects. It has to do with the effects of altitude and rates of descent and ascent. A pilot may not suffer discomfort from an altitude of 15,000 feet at one age but a few years later be affected very adversely by an altitude of 10,000 feet.

The effect of sound in relation to pilot fatigue is a third vital subject demanding broader understanding. A cockpit is subject to all sorts and varieties of noises . . . engine noises, radio signals and voices, propeller noises, hydraulic gear noises, etc. That these noises all add up to effect upon the pilot is beyond question but which of them or what combinations of them contribute most to make his work fatiguing or monotonous is the sixty four dollar question.

Even the subject of what the pilot wears is known to have bearing on his efficiency. This particular phase is of special concern to the military airman, clad as he often is in "space suits", heavy helmets and bulky boots, to say nothing of parachutes, inflation gear, sidearms and emergency rations attached to him here and there.

Turning from the physiological to the psychological aspects of pilot qualifications we find even greater urge for research. Legally a man who cannot pass a physical examination can be grounded. Nor would grounding of a proven psychotic individual be impossible. If perfect tests were available, and the law changed, there would be no problem. Of course there are many sound tests such as aptitude and interest but it is a ticklish business to refuse a pilot license on the basis of mental unfitness.

CAA records show that from 75 to 80 per cent of all accidents are due to pilot error. Frequently this

error can be traced to distractions or worries which in themselves have nothing to do with flying skill—domestic trouble, financial stringency and kindred problems which breed temporary carelessness, absent-mindedness, and warped judgment. It has also been found that if a pilot has one accident he is twice as likely to have another, and if he has the second he is three times as likely to have a third.

Harking back to that key-point where declining faculties balance with experience and skill, A. T. Welford in his treatise, "Skill and Age", tested many groups of people for their ability to learn and relearn. His conclusions showed: (1) the age-thirty group made the same number of errors as age-twenty but took a substantially longer time per trial; (2) the age-forty group required more trials and made more errors than the age-thirty group but took little more time; (3) beyond the forties (*Continued on page* 42)

Lt. James Oliver of the First APO adjusts the device which fires a cartridge 2 minutes after 100′ chute is launched, cutting cord which restricts chute and assuring uniform opening.

Vertical delivery is a precise art, as perfected by the drop masters of the First APO.

Drop Everything!

Air-landed equipment floats gently toward the snow-blanketed Nord site.

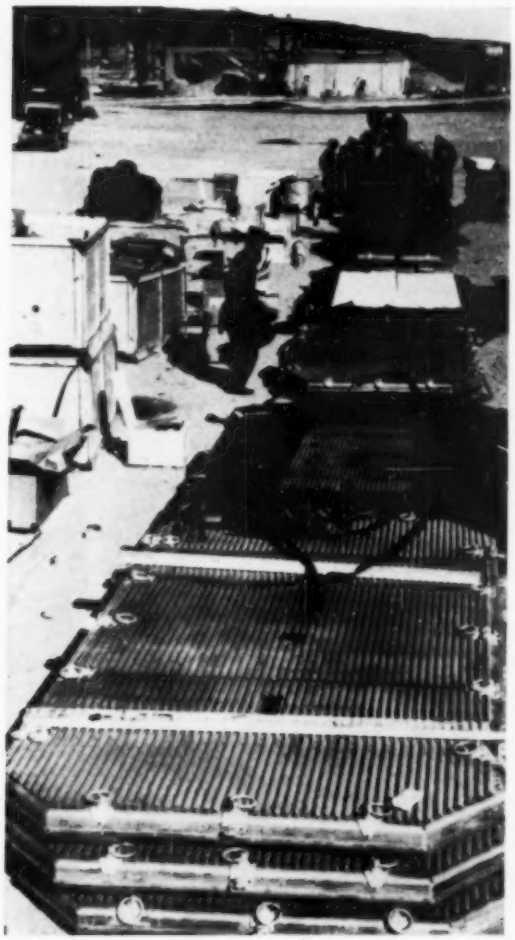
By LEVERETT G. RICHARDS

A STORK—with a bulldozer in his beak—might well be the insignia of the First APO. For the men of the First Aerial Port Operations squadron are the delivery experts of the 18th (Troop Carrier) Air Force.

Actually the squadron is too young to have an insignia, and too busy making history in its specialty to think about a coat of arms. It was organized January 3, 1952, at Donaldson Air Force Base, Greenville, S. C., headquarters of the 18th AF, to cope with the problem of delivering men, materials and machinery in the airborne operations which play a leading role in modern military planning.

In their first four months of service the eight officers and 201 airmen of the First APO handled more than 2,000,000 pounds of equipment in air landing maneuvers and unloaded more than 10,000,000 pounds of equipment and supplies. During Operation Longhorn they acted as expediters in the movement of an airborne division by air from South Carolina to Texas and back to Indianapolis—more than 19,000 men and 3,500 tons of equipment in 800 aircraft. Their latest assignment is in Alaska where the Air Force and the airborne infantry are conducting continuous maneuvers to improve our Arctic defenses.

The specialists of the First APO are skilled aerial stevedores specially trained to establish and operate terminals for loading and unloading men and machinery



Left, the First APO's production line. Note metal pallets in foreground. *Above*, Capt. "Smokey" Stover inspects load ready for plane, while A/2c G. E. Powers, atop load, makes final connections. *Below*, packaged loads, ready for vertical delivery, are rolled from a flat bed truck into a *Boxcar*.

with speed and efficiency. Each flight has its own heavy equipment drivers to man the trucks, tractors and fork-lifts, as well as supply specialists to account for the millions of dollars of equipment and supplies that pass rapidly through their hands. Every man is a load master, trained to figure the center of gravity of every type of airplane and place the load quickly, securely and correctly. A misplaced load, or a shifting load, may mean disaster on take-off, in rough air, or on landing.

Vertical delivery—by parachute—is becoming more and more important in modern military operations; and it is there that the First APO is writing a new book of rules. Every flight of the Air Force's newest squadron of specialists includes drop masters selected from the cream of the 18th Air Force.

Their job is not merely to push supplies out of airplanes and hope the stuff lands in recognizable condition within sight of the drop zone. Their job is to help the Troop Carrier pilots deliver everything from eggs to underwear, from bulldozers to bathtubs with the care and precision of a good paper boy delivering the morning gazette.

When the first APO delivered an ordinary glass flask of liquid serum to the front door of a field hospital by air, that was no stroke of luck. When they delivered two and a half tons of winter rations by parachute in one huge bundle literally on the doorstep of a Danish outpost on the northeast tip of Greenland, that was no accident.

In these as in all cases, the job of the First APO began with the design of a package that would absorb the landing shock; selection of the right parachute, if any, for the job; packing and rigging the package and parachute; selecting the right altitude and timing for the drop; and, in many cases, riding through the "bombing run" with the pilots of the Troop Carrier aircraft to assist in the actual delivery. All the pilot has to do is to pull the trigger—at the right time and place—which takes a bit of doing and constitutes another story in itself.

"There is no book of rules," says Major O. E. Winn, commander of the unit. "We're writing the rules as we go along. Every day one of my airmen comes up with some new improvement which pays off. We've gone far enough now to feel sure that we can safely deliver by free drop or parachute anything we can get into an airplane. If we can't deliver it, it isn't worth having."

During the last war Major Winn commanded an airborne quartermaster's company, the nearest thing to a predecessor to the 1st APO. He was serving with the Military Air Transport Service in Saudi Arabia when called to organize the First APO.

The first big operational task (as distinguished from training maneuvers) assigned to the First APO was one of the toughest jobs in Air Force history—participation in Project Parkway. The operational order simply called for the delivery by air of a weather and radio station for the Danes, who own Greenland, and the machinery for the U.S. Weather Bureau to build (*Continued on page* 59)

PIPERS ON FLOATS

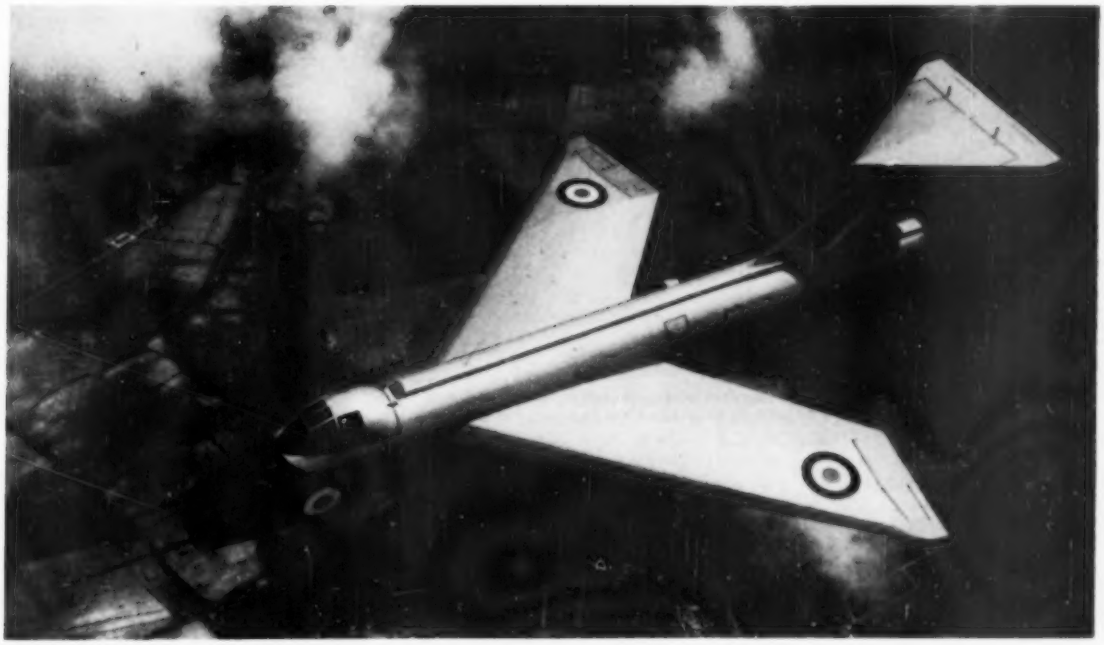
As always, summer has greatly increased demand for floatplanes. Shown here are a two-place 135 hp *Super Cub* utility ship (in foreground) and four-place 135 hp Piper *Pacer*. The *Super Cub* was recently approved on Edo Model 2000 floats (2,000 lbs. displacement) which give the ship unusually good buoyancy with heavy loads. Formerly only 1,400-lb. displacement floats had been approved.

CESSNA 195

At right is the new Cessna 195 *Businessliner*, five-place, single engine plane incorporating a number of improvements. More accurate airspeed indicator system, flaps 50 per cent larger than those used on previous models, and elevator redesigned to afford smoother ride in all weather are new features. The 1953 version of the Cessna 195 (first introduced in 1947) is powered by a 275 hp or 300 hp Jacobs engine.

AIRFREIGHTER

Notice anything odd about the Douglas DC-6A at left? You're right—no windows. Built for American Airlines cargo service between Chicago and New York, this plane carries 30,000 lbs. at 310 mph in its 5,000 cubic ft. of unobstructed cargo space. Four Pratt & Whitney 2,400-hp engines provide power. AA has ordered two more windowless planes for delivery this summer.



SHORT S.B./5 Latest in-flight photo of England's Short S.B./5 research aircraft shows "adjustable wings" flying at a sweep-back of 50°. In later experiments it will fly with 60° and 69° sweep-back. Tail plane is also variable. S.B./5 is powered by single Rolls Royce Derwent jet engine. Tom Brooke-Smith, chief test pilot of Short Bros. and Hartland Ltd., is at controls.

Have You Seen?

TURBO-COMPOUND Above is the first flight photo of a Lockheed *Super Constellation* airliner powered by turbo-compound engines. KLM Royal Dutch Airlines received first of this type. Sixteen airlines have ordered total of more than 90. Turbo-compounds employ special exhaust turbine device, give maximum cruise of 335 mph, will cut 2 hrs. from transatlantic schedules.

DEMON Photo at left of McDonnell XF3H-1 *Demon* is first unretouched glimpse of Navy's single-jet, swept-wing fighter. Performance details of *Demon* (described by Navy as "superior to MIG-15) remain classified. *Demon*, soon to undergo carrier suitability trials at Patuxent, Md., is being built at St. Louis.

The author poses with a *Super Cub*—somewhat older and considerably wiser and better equipped than he was the day he took off for a breakfast flight and ended as a "thumbtack."

NO. 164

I learned about flying from that!

Hindsight's no use when you're lost over Alaska, and out of gas.

By JACK KATZENSTEIN

ON THE WALL of the CAA office at Weeks Field in Fairbanks is a map of the Territory of Alaska, covered with colored thumbtacks. They are scattered from the fog-bound Aleutians to Point Barrow; from Kotzebue on the Arctic Coast to Ketchikan, first Alaskan city on the mountainous Pacific coastline. Each tack marks the wreckage of a plane down somewhere in the mountains or tundra, so marked to avoid confusion during search and rescue operations.

I learned about flying the hardest possible way; by contributing another tack to the map.

The great majority of lessons of this sort learned about bush flying did the pupils no good; they were either found dead or not found at all, the only trace being a note fastened to the instrument panel: "Am walking southwest down the creek, have rifle and three days food . . ."

Mine was a terrifying experience, and a costly one, as airplanes run high in the Territory. Yet, I think it taught me more about flying than a hundred hours of flying in well-populated sections of the United States.

I learned to fly in Fairbanks in the winter of 1951-52. Flight instruction in 30-below weather with only three hours of daylight is a trying experience. Nevertheless, I managed to solo in 14 hours.

My first cross-country flight will always remain one of my most vivid flying experiences, as well as one of the most daring. This was before the dual cross-country requirement was put into the CAR. After 10 solo hours I flew a 65 hp Taylorcraft from Fairbanks to Nenana, to Tanana where the Yukon and Tanana Rivers meet, and back to Fairbanks. It is a cross-country flight I would hesitate to make today, even with my new PA-18 equipped with all navigational aids and a 600-mile range. The country is barren except for an occasional road house or mining claim. Fortunately there was the Tanana River to follow all the way which, frozen as it was, provided a continuous emergency field for a ski-equipped plane.

Sudden spring came to Alaska and I decided it was time to get some more X-C time in the Territory. I bought a 1946 Aeronca *Chief*. It had no radio and only a basic instrument group, but it had good range and was in good condition. I could hardly wait to undertake a breakfast flight to Circle Hot Springs.

Circle Hot Springs is a resort hotel about 120 miles northeast of Fairbanks and about seven miles south of the Steese highway, a gravel road about 150 miles long from Fairbanks to Circle, Alaska, on the Yukon. Most of the way it runs along the south shoulder of a line of ridges averaging 4,000 feet in height. The highway is only about one-quarter of the way up the ridges from the floor of the Chatanika River and hence is virtually invisible from the air when approached from the north.

With the assurance that all I had to do was follow the highway, I took off, and an hour and a half later was gliding into a landing at the Circle Hot Springs strip. Here I encountered a (*Continued on page* 60)

This is what the planes of the USAF 10th Rescue Squadron saw when they came upon our hero and his Aeronca *Chief*, woefully stranded in a creek bed in the midst of Alaskan tundra.

OPERATORS' CORNER

National Aviation Trades Association (NATA) is a service group that represents all service segments of the airport, fixed-base and air service operator. Its staff represents a federation of State Chapters and Members-At-Large. Its purpose is to fountainhead all activities of the American Operator, and to act as a sounding board for better public relations. Its aim: to improve air service operations and promote greater aircraft utilization.

Headquarters are located at 1346 Conn. Ave., N. W., Washington, D. C. Members receive a monthly "Washington News Letter" of confidential legislative and policy news in the making.

National Air Taxi Conference, same address, an affiliate of NATA, represents operators engaged in perfecting and standardizing a system of "through" air transportation.

Opinions expressed in this column are not necessarily those of FLYING Magazine.

HELICOPTER MAINTENANCE

Arthur Currey, former president of NATA and long established operator at Galesburg, Ill., recently completed a contract for field maintenance of 5th Army aircraft. Included in this was helicopter maintenance, awarded to Currey in view of his six years' helicopter operations and maintenance experience.

This is the first time that 'copter maintenance has been issued to a fixed-base operator. It is believed the move by the 5th Army presages the release of further contracts of this nature.

• • •

GOLF SIDELINE

A golf driving range has been added to his airport's income-producing facilities by Larry Straley, president of the Iowa Flight Operators Association and operator of the Clinton Airport.

• • •

AIRPORT LEASES

In an effort to obtain greater security of tenure on airport sites and place operators in a position to do some long range planning, NATA has launched a lease survey. Both NATA's president, Harland Herrin, and vice president for Airports, Glenn Degner, have been concentrating on the problem of improving operator leasing arrangements with public airport authorities.

• • •

SERVICE WITH A SMILE

According to the Sixth Annual Wisconsin Aeronautics Conference, the following customer-relations ideas have proven highly acceptable to the paying public:

1. To cope with the noise problem and many times to resolve in the operator's favor the question of whether to gas or not to gas, prepare a stiff placard with

"GAS?" on one side and

"PARK?" on the other,

of course holding up the "GAS?" side first.

2. On a separate card or printed on the sales and service receipt slip itself, let it be known what free courtesy services and checks have been rendered.

3. On own initiative ask if hotel (or motel) accommodations are desired, in the case of pilots requesting overnight aircraft parking.

4. Maintenance of a clean (but not necessarily new model) courtesy car—reserving it *exclusively* for such use—operated on a voluntary contribution basis and with name of air service, name and location of airport, and "COURTESY CAR" on the sides. It was brought out that some auto dealers are willing, as an advertising proposition, to make new model cars available for this purpose on a nominal basis, in which case there will be added on the sides "Furnished by (auto dealer's firm name)."

• • •

INSURANCE COSTLY? $$$$$$$$

Explaining why insurance costs so much, Ed Marshall, field engineer for American Mercury Insurance Company, relates the following tale of woe:

Recently in one of the blue-blooded eastern states, an operator settled two young lads in the rear seat of a *Champion*, one of his three-plane fleet, and proceeded along to crank his plane. Just as the engine fired, one of the boys decided that he did not want an airplane ride and made haste to exit. Speed rather than caution was on his mind.

He grabbed the nearest protruding object to assist his hurried departure. It was the throttle. And he rammed it open.

By then the boy was out and gone. And the operator was playing anchor man in a tug-o-war with 65 hp bellowing to go somewhere. With a dogged grip on the strut he tried to edge in toward the window where he could get a hand on the switch. Not to be outsmarted the *Champion* began to pivot around its opponent, finally clawing a wheel up on his leg with such force that the bone snapped.

Triumphant and free, the *Aeronca* roared straight back into the open hangar from which it had just been trundled out, and went to work on a nearly new *Tri-Pacer* like a hound going after hamburger. When help finally arrived, the *Champion's* prop was only a nub, but its engine was still roaring victoriously away. The demoralized condition of the *Tri-Pacer* must be seen to be appreciated.

The net result of this incident: two-thirds of the operator's fleet out of commission, one broken leg, a heavy loss payment by the insurance company, a loss of many revenue flight hours by the operator, plenty of scarcely favorable publicity, and one young boy who reportedly is running yet.

Taxiway guidance signs, one possible remedy to airport traffic problems, have been developed by Crouse-Hinds. When lighted, at one-quarter mile day or night visibility conditions, the panel letters are legible at distances well over 500 feet. With letters outlined in black on a yellow background and appearing luminous at night, the new signs have from one to six interchangeable aluminum letter panels. All signs are equipped with breakable aluminum couplings designed to withstand prop blasts but snap readily under the force of a slight impact to prevent damage to airplanes.

Gremlins Sometimes Get You

(Continued from page 15)

fracturing the skin, and shearing off the right wheel completely and damaging the tail wheel, we still bounced back in the air and continued to fly. My passengers say we settled nearly to the ground again but, being extraordinarily busy at the time, I missed this second maneuver.

We climbed into the pattern, and the tower confirmed our suspicions that we had lost a wheel. While the ship had good flying characteristics, I slowed it down, feeling that we could easily have other damage. We made a pass at the tower and the operators, with their glasses, could detect no other damage. As I had never practiced one-wheel landings, I advised the tower I would be happy to listen to any suggestions.

At the tower's request, I tuned the radio to Ground Control. The conversation between the crash trucks, CAA, etc., was definitely not conducive to complete relaxation.

While on Final, on Runway Three, I received one suggestion that undoubtedly improved our position. It was recommended that I use Runway 35, despite the slight cross-wind, as it was all concrete, against Runway Three, with an asphalt topping. Granted this reprieve, I pulled up and went around again.

I was racking my brain. Should I be a little hot to be sure my right wing could be held up, or should I slow it down to the stalling point to minimize the possibility of ground-looping or even cartwheeling? I then remembered that during the War, when students made wheel-up landings, there was usually little damage if the student wasn't aware his gear was up, and came in for a normal landing. When he couldn't get it down, and attempted unusual correction and allowances, he generally clobbered it up. As a result of this reasoning, our landing was routine.

The balance of my story is pretty much anticlimax. We rolled along on one wheel. (Again I feel that our cross-wind gear was an asset.) We fell off on our stub at about 30 mph, with everything shut off. Gentle brake application kept us straight down the runway. The damaged wheel had smashed our door shut, but the crash boys were on us like bees, and we had made it.

The force of the crash had popped rivets out all over the ship, from cowling to wing sections. The structural members behind the fire wall were fractured. All new skin was necessary around the entire cabin section. A new right wing tip was needed, but no wing structural damage was sustained. Two new wheels, with component and structural parts, and we were in the air again.

Incidentally, we picked up our Cessna 170 and continued our trip that day. I was a little afraid to ride with myself, but my two companions had renewed confidence. If I could get down with one wheel, look what I could do with three!

I hope to have a new "Tip on Flying" published in a future issue. It will have to do with the propwash following large aircraft on take-offs and landings. The newspaper said it was a freak accident. Some said it was a phenomenon. I have never been checked out on either of these. I thought I played it safe and waited until the influencing plane was over a mile away. The tower concurred. How long would you have waited? END

Adirondacks Bush Pilot

Typical of the "general service" operations being successfully conducted in resort areas of the United States is Helms' Aero Service at Long Lake, N. Y., in the heart of the Adirondacks.

Using the new Cessna 195 on floats shown on this month's cover and above, operator Herb Helms does a brisk air taxi business among the Adirondack lakes, forming an air transportation link from airline stop to lake resorts and isolated fishing and hunting camps.

The "195" doubles nicely as a cargo carrier, frequently hauling lumber and even boats strapped to the floats. A regular conservation assignment from the State is the aerial planting of fish in the numerous Adirondack lakes. Always on call for emergency medical flights, the ship is an invaluable asset to the whole region.

A navigator with the 8th Air Force in World War II, Helms returned to his home at Long Lake to establish his air service, in operation now for seven years. A quiet, unassuming man, he has the complete confidence of his fellow townsmen who will ride with him anywhere—and frequently do.

Can Grandpa Fly?

(Continued from page 35)

all scores rose rapidly. People in the sixties required more than twice as many trials as the age-twenty group, as well as making three and one-half times as many errors and taking four times as long.

What does this mean in terms of pilot-age?

Dr. B. G. King, CAA Medical Division executive, believes the type and complexity of the aircraft to be a significant factor in how long Grandpa will fly. Such matters as standard instrument panels, convenience of controls, identification of various gear levers, cabin comfort, and good visibility have great bearing on how long the old gentleman will push his own way around the sky.

As a general rule it is found that the 40 to 80 age-group have arrived at a sensible philosophy of flying. It is not merely that caution comes with age but also that relative values are weighed with greater judgment. Grandpa doesn't have to prove to himself that he is a hot shot, and buzzing the house to show off before Grandma is no longer a part of his vanity. He is not likely to buck the thunderheads because he wants to brag about it to the other old bucks. Additionally there is the realization that if he does get in trouble he is not so likely to get out with a whole skin. The one temptation Grandpa runs is to over-sell himself on his ability or on the capability of various pilot aids to keep him out of trouble. There will never be a time when education is not as valuable to sixty as to sixteen.

The sum and substance of a pilot's ability to whip the age problem therefore appears to head up in two main directions—better yardsticks by which to measure piloting longevity and better aids to compensate for the age deterioration of human faculties . . . such aids as the automatic pilot and the stall warning indicator.

In this case, thousands of Grandpa's may share 82-year-old Starr Nelson's experience. Some one asked him one day how long he had been piloting his own airplane. He replied, "Ever since the railroad said I was too old to drive one of their engines any more." END

It's always VFR for...

DE HAVILAND DOVE

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Flying executives, private plane owners, commercial airline operators all recognize the famous Esso Wings. They stand for dependable service at Esso Dealer Airports and high quality Esso Aviation fuels and lubricants.

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1953** The Golden Anniversary Year of Powered Flight. ESSO Experience in Aviation Began with the Wright Brothers in **1903

AVIATION PRODUCTS

MAIL BOX

(Continued from page 9)

MISSING LINK

Congratulations on your series "Genealogy of American Aircraft." That's the sort of thing I like. But what happened to the Republic *Seabee* in July? There also was the Republic XP-69, but it was never built.

FRANK MILLER

Cincinnati, Ohio

• *Editor freely admits doping off on this one.*—ED.

ANENT THE ADMIRAL

Rear Admiral van Deurs ("The Admiral Sounds Off," FLYING, July) relays the trouble the recruiting officers are having in recruiting young men for pilot training.

I have tried several times to get into Cadet training, either Navy or Air Force, in the past four years. Every time I was refused because I do not have two years of college. I was told I could go on active duty from Reserves and apply for training after having served something like six months. I will not do this because I know of too many fellows who followed this method and were never given a chance at Cadet training. I would dread the thought of serving three years behind a typewriter or changing spark plugs.

I have been flying for several years and received my commercial license a short time ago. I will have my instrument rating soon. All of my time I have gotten with my hard earned cash.

I am now 25 years old and the time is nearing when I'll be too old for Cadet training. I would like very much to fly our fast military jets if only given a fair chance at the program.

Maybe our government is looking in the wrong places for good military pilots. Instead of just going to colleges, they ought also to go to the local flying fields and recruit some of the boys who are putting out their own cash to learn to fly. I am sure some of these boys have much more flying in them than a Liberal Arts student has.

ROBERT J. MASER

St. Louis, Mo.

I started to fly when 15 and had my commercial license with instructor rating when 20. I didn't enlist in the Navy or Air Force for pilot training because I have only one semester of college, not two years.

I was drafted in July, 1952, and now have 13 months left to serve in the Army. I am in an artillery outfit and can't even get in the air section of it.

Why won't the military let a man fly for them when he can meet all CAA requirements? I have an average or above average IQ and am in very good physical condition. I don't feel two years of animal husbandry would help me be a better pilot.

ELMER J. STEIER
Pfc, USA

Fort Bragg, N. C.

FREE BALLOONS MAKE COMEBACK

Free balloon helps train airship pilots.

AIRPORT control towers in the Akron area will soon be alerted as free balloons are sent aloft as part of the training of lighter-than-air pilots for Goodyear Aircraft Corp. An LTA pilot training program now in progress at Goodyear will provide pilots required by the firm's expanding Navy airship program.

Modern airships, used mainly in coastal areas for submarine spotting, would be maneuvered in the same manner as a free balloon in the event of complete engine failure. Ballast would be thrown overboard to gain altitude and gas valved off to permit descent. As a safety measure, it is mandatory that airship pilots trained by Goodyear be qualified to handle free balloons.

The free balloon, with a history dating back to the 1783 experiments of the Montgolfier Brothers in France, is a simple craft. It rides with the wind and has no power to direct its course. The balloon pilot cannot control the direction of flight. The trick is to analyze weather conditions and maneuver, with minimum loss of ballast, to altitudes where wind directions and velocities are most favorable.

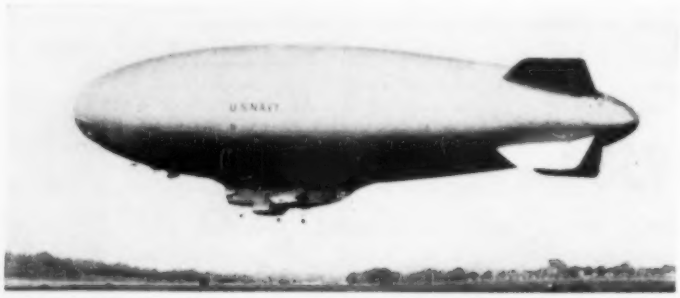
Equipment includes the bag itself, with a valve at the top by which the pilot can release his lifting gas manually, and an open appendix at the bottom which releases the gas as it expands with altitude and temperature; a net to which the balloon basket is attached; the basket in which the pilot rides; a load ring which constitutes the attachment point between net and basket; sand bags for ballast and a drag rope.

The drag rope, perhaps 500 feet of heavy manila, is carried in the basket for use when the pilot wishes to fly at a low altitude. He releases the rope so that it drags the ground; as the balloon descends it has less weight to drag, so tends to move upward; as it moves upward, it has to lift more rope and descends again, thus maintaining a fairly constant altitude.

Approximately 25 students have been selected for LTA ground school training at Goodyear Aircraft. The program is conducted at Kent State University, Kent, Ohio. Overall training calls for 150 hours of instruction, given two nights a week over a six-month period. Students are between 25 and 35 years of age and have two years of college training or the equivalent.

Students successfully completing the ground course are transferred to the airship operations department at Wingfoot Lake Airship Base to receive flight training in free balloons and non-rigid airships.

Students must log more than 10 hours in free balloons before they are permitted to handle non-rigid airship controls. Such training insures the successful testing of the non-rigid airships being produced by Goodyear for the Navy

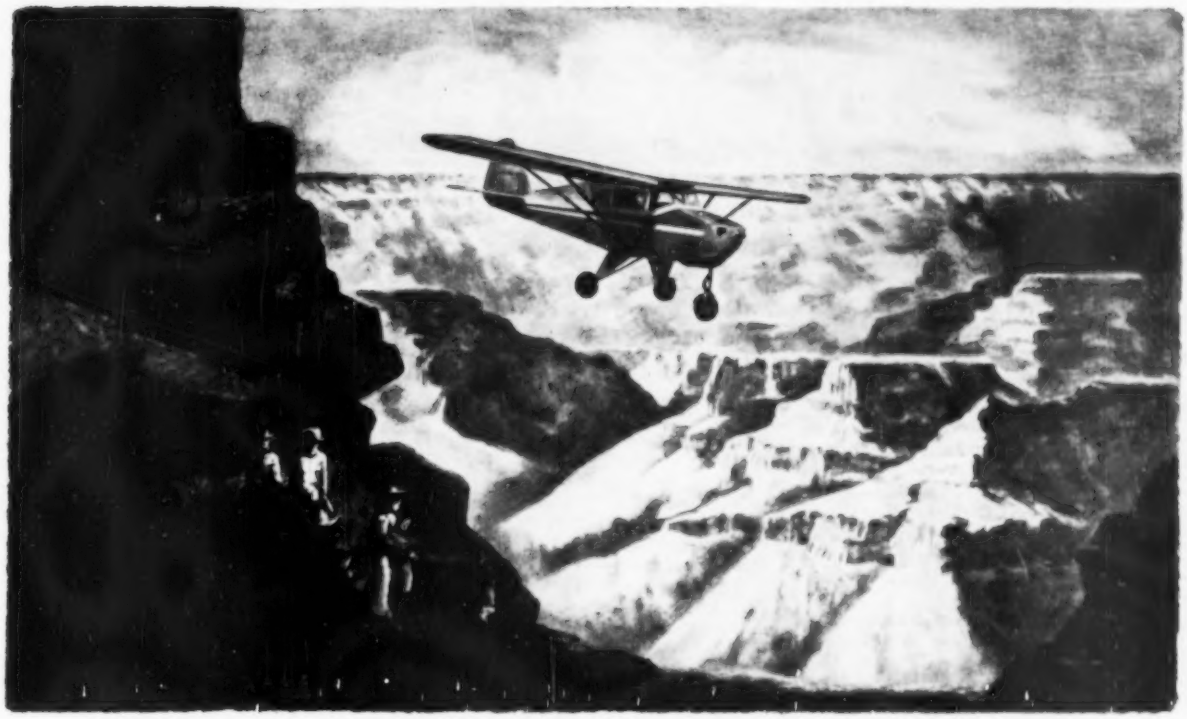


Navy's ZP2N zeppelins, largest non-rigid airships, are link in anti-sub warfare.

PLANE FAX

Your Best Week-end Flight Plan for September

This month plan a flight to the Grand Canyon—1009 square miles of fantastic cliffs and spires. Land at Valle Airport for bus service to the Canyon rim, and for quality Standard Oil aviation products.



Sightseeing by Air Inside the Grand Canyon

A bird's-eye view of the Grand Canyon from "inside"—that's daily fare for Al Hudgin of Hudgin Air Service. From his summer base at Valle Airport, he flies sightseers over 125 miles of the Painted Desert and the Canyon, probably the most rugged terrain in the West.

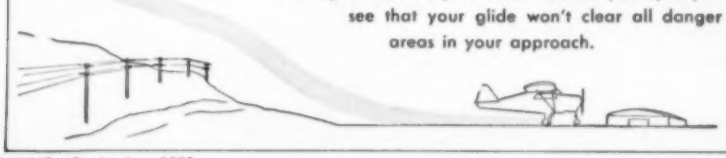
"I like to fly over scenery like this," says Mr. Hudgin, "as long as I can count on my plane. I'm always careful to check the plane myself. And we keep it filled with Chevron 80/87 Aviation Gasoline for extra take-off power and smooth cruising. It has never fouled our spark plugs.

"What's more, we keep our planes in top condition by using New RPM Aviation Oil. It gives us from 1000 to 1400 hours between overhauls—over 400 more flying hours than ever before. When we overhaul an engine that's used New 'RPM,' we find very little wear. Cylinder wear is less than a thousandth of an inch, even after such long service. And New 'RPM' eliminates pre-ignition and rough running due to oil while it keeps engines clean. We've never had a stuck ring or valve when using New RPM Aviation Oil."

T.M.'S "RPM", "CHEVRON," REG. U.S. PAT. OFF.

TIP OF THE MONTH

Don't try to stretch your glide when landing. Keep up your air speed so that you will be able to pull up if you see that your glide won't clear all danger areas in your approach.



CHEVRON AVIATION GASOLINE
NEW RPM AVIATION OIL
STANDARD OIL COMPANY OF CALIFORNIA

WING TALK

CAP Cadets Betty Jo Duggan and Anthony Frank Isola, Jr., of Memphis get a C-119 cockpit check from Capt. Charlie Garville of Nashville before taking off on a familiarization flight. The scene is the summer encampment at Sewart AFB, Smyrna, Tenn.

CADET VIES FOR MISS AMERICA TITLE

When the nation's most beautiful girls walk down the boardwalk at Atlantic City on Labor Day in the 1953 Miss America beauty pagent, Civil Air Patrol will have its own entry—lovely, 18-year-old Jeannine McColl, a CAP cadet from Las Vegas, Nev., who will compete as Miss Nevada.

The gorgeous, redhaired Nevadan won the statewide competition in June, outclassing three rivals for the state title. She was sponsored by the Nevada Wing, CAP-USAF.

Texas-born, Jeannine has resided in Las Vegas for the past seven years. She is a language student at the University of Nevada and a member of the Las Vegas Squadron, CAP.

Presently Jeannine is learning to fly in order to become a CAP rated pilot.

She won every phase of the statewide competition hands-down. Her beauty in both a scintillating evening gown and a chic swim suit won the plaudits of the judges, but her modern ballet routine in the talent phase of the competition was the crowning touch.

Jeannine also has been designated Miss Civil Air Patrol by CAP national headquarters.

CAP BACKS AIR FORCE FIGHT

The 77,000 members of Civil Air Patrol have taken a definite stand in the Congressional battle for funds for the Air Force. At the 1953 annual meeting of CAP in Cheyenne, Wyo., Col. D. Harold Byrd, vice chairman of the CAP National Executive Board, declared:

"We realize our only hope of stopping aggression or maintaining a hope of winning against millions of Communistic Russians and their satellites is by creating and maintaining absolute and undeniable air supremacy.

"The fact that we in CAP realize that we must have air supremacy is not enough. We must use every means at our disposal to impress on our entire population the concept of survival by air supremacy.

"We must take unified and concerted action to stop this bickering in Washington about how much air power this country needs and how much we can afford. I can't believe that any patriotic American is quibbling over taxes for the defense of our way of life. The quibbling is over what type and the amount of defenses we shall spend our money for.

"We in Civil Air Patrol will do everything in our power to insure that not one American boy will lay down his life because of the lack of one more bomber or fighter plane, nor will one American citizen be struck down on the streets of his city because our air defenses were not adequate.

"If our partner, the Air Force, will tell us what is required of us, the more than 77,000 members of CAP will pledge their efforts, their time and their money to this critical cause.

"By the grace of God and with the secure knowledge of complete mastery of the skies our nation can then proceed with honor and dignity in our attempts to prevent World War III. And if World War III does come, despite our efforts, we will be so powerful that there can be no doubt about the outcome: complete and utter ruin for our enemies."

MAN IN DESERT OWES LIFE TO CAP

The life of a Los Angeles citizen was saved recently by two CAP members who spotted the man close to exhaustion on the Arizona desert.

Maj. C. H. Weidner of the Yuma Squadron and Col. Elmer McTaggert of Yuma Air Force Base, flying in a T-6, sighted the traveler miles from civilization. After dropping water, food and instructions, the fliers returned to Yuma, acquired a jeep and drove out into the desert to pick the man up.

He was identified as a Mr. Ferman of Los Angeles but no explanation was available as to how he become lost in the desert. He said he had walked about 50 miles and had been without food and water for more than 24 hours.

AIR FORCE AUTHORIZES UNIFORM ITEMS

The white shirt finally is out as far as the CAP duty uniform is concerned. The Air Force has authorized wearing of the regulation blue shirt with the winter uniform and the tan shirt, Shade 505, with the summer service uniform. The Air Force blue raincoat and blue overcoat also have been authorized for wear.

The blue shirt and blue jacket or blouse have been authorized for male cadet winter wear.

The complete WAF uniform, both service and white dress, have been authorized for female members.

VIRGINIA JUBILEE HAILED

The Virginia Aviation Jubilee sponsored statewide by CAP's Virginia Wing and the State Division of Aeronautics was hailed by Gen. James H. Doolittle, chairman of the 50th Anniversary of Powered Flight committee, as a "splendid accomplishment."

In a letter to Governor John S. Battle of Virginia, the general said:

"I hasten to offer my heartiest congratulations for a splendid accomplishment. Virginia leads the states thus far with the kind of broad-based program we are most anxious to develop. Reaching as it has into the schools, stores and industrial shops, your Jubilee will do a lot of good for aviation."

CAP's entrant in the Miss America competition for 1953 is Cadet Jeannine McColl, sponsored by the Nevada Wing, CAP-USAF, who will compete as Miss Nevada. Jeannine is shown with Col. Weld Arnold, Nevada wing commander, and Maj. Calvin R. Hall, AF-CAP liaison officer.

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Winter is the Worst

(Continued from page 19)

the fronts have more or less stagnated. In the first place, most of these clouds have tops ranging from 4,000 to 7,000 feet, occasionally swelling to the neighborhood of 12,000 feet. The air at 15° and colder doesn't hold much moisture in this situation and much of what it does hold is frozen and won't do any particular damage.

The preceding is easy advice to tender but not to follow if you are flying a lightplane. However, aircraft such as the Cessna 190, *Navion*, and the like, can nose upstairs in a hurry if required. This is no time to nurse the throttle.

An exception to this rule for fast climbs is a condition where you are flying in sub-freezing temperatures and in order to reach the top or get high enough to do any good, you must thrust through an inversion that is hugging the dangerous 30° mark. The very cold metal airplane, as it passes rapidly through the inversion, picks up frost from the warmer, more humid region of the inversion. As the plane hastens on into the below-freezing, moisture laden cloud above the inversion, the frost provides a tenacious toehold for ice on every rivet, ridge and paint scratch.

The proper course is to maintain a slow rate of climb through the inversion to permit the plane to assume the temperature of the surrounding air. This will eliminate the frost.

Safety Up High

One of the decided advantages of pressurized aircraft is their ability to cruise way up yonder, say 18,000 feet, where all they see is ice crystals and rime ice. Of course they have no immunity against acquiring a hefty load on the climb or descent or in the vicinity of a cold front or mountains, where lifting can carry super-cooled water droplets far above the freezing level and still not freeze them until an unwary airplane comes busting along to disturb the delicate balance.

Talking about *supercooled*, an everyday example of this phenomenon is furnished by the Coke machine. You have no doubt dropped your dime in and when you eagerly picked up the bottle it instantly froze. It was too cold (supercooled), and your moving it, or the action of the bottle dropping into a slot, disturbed the suspended molecules—and you lost your Coke to the ice.

Generally speaking, anti-icing and de-icing equipment on modern airline and executive aircraft will handle any ordinary icing condition. One of the big bugaboos—restriction of visibility from iced-up windshields—can be licked by modern heated windshield installations. In the past, many a DC-3 (and many a single-engine job, too) landed with a window knocked out because the ice couldn't be removed or the window opened. As far as lightplanes are concerned, the essentials for limited winter flying, in addition to the always present carburetor heat, are a pitot heater, plus propeller and windshield alcohol.

As long as the prop is kept clear so it can tow you along, and the windshield will let you see to land, you can manage the average winter air mass cloud conditions. Wings will handle a good bit of ice, but that old prop has to be able to develop its power.

The likelihood of encountering ice is much greater in major fronts and low pressure centers than in other areas. A research group has computed the percentage probability as follows:

1. In major fronts or in the center of cyclones 65%
2. In occlusions or areas of convergence 44%
3. In anticyclones (highs) 19%

Act in Time

In addition, severe ice was discovered to be much more prevalent in main fronts and in the center of lows than in other areas. Severe icing demands a very high moisture content or instability or a combination of both. Whether icing is light or heavy depends on the *rate* of accretion. Light ice, if flown in long enough, could give you a heavy load of ice, but it still would be considered light icing. Moral: don't wait too long to take some action even against light icing.

The thicker the cloud cover *above* the freezing level, and the wider the cloud cover, the higher the incidence of ice. Check this closely—if part of the cloud deck is above freezing and part below, there will be much more ice to plague the unsuspecting than if the entire cloud depth is below freezing. It is that old rule again. Warm air holds more moisture in a given space than cold air.

Along this line, remember that the farther below freezing the surface temperature, the lower the moisture content of the clouds above (unless there is an inversion). If the surface is 28° F or below, the clouds will be fairly dry.

Getting back to statistics, unless the sky cover is a complete overcast, the occurrence of ice is of a minor nature, relatively speaking. Within the area of below freezing cloud, the percentage chances of getting ice as related to the extent of sky cover has been found to be:

1-3 tenths	1%
4-6 tenths	5%
7-8 tenths	17%
9 tenths	33%
10 tenths	50%

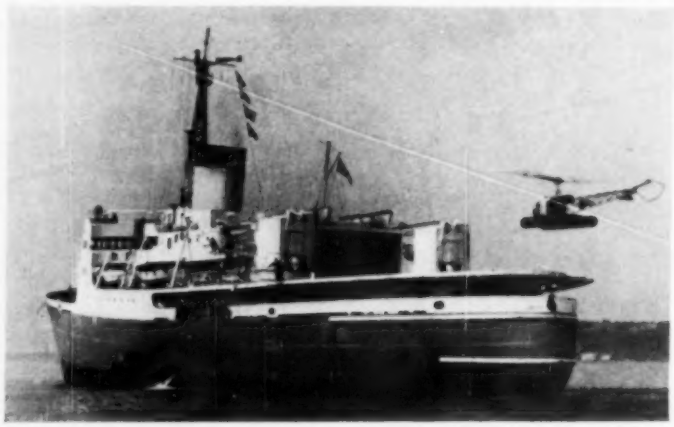
In unstable (cumulus) air, the frequency of ice is almost 2½ times as high as in stable (stratus) type clouds. Heavy ice has seldom to be reckoned with except in cumulus, strato-cumulus or cumulo-nimbus. Stratified clouds usually don't har-

BLIZZARD TUNNEL

A blizzard tunnel for use by research engineers to improve methods of eliminating ice from airplanes has recently been built by Lockheed Aircraft Corp. at Burbank.

The 9,600-cubic foot icing tunnel is chilled by the equivalent of 776 home refrigerators. In it, ice storms, misty spray and winds of hurricane force are mechanically created to duplicate flying conditions in ice-forming weather.

Parts scheduled for testing in the new tunnel, first such scientific tube west of the Mississippi, include airplane wings, control surfaces, deicer boots, engine heater air inlets, carburetor intakes and built-in antennas and radomes.



'COPTERS FOR ICEBREAKER

Canada's new icebreaker, *C.G.S. d'Iberville*, carries as part of its standard equipment two Bell helicopters, which are housed in a heated hangar in the aft end of the deckhouse superstructure (visible in the picture). The helicopters were aboard the ship on its shakedown cruise, which included participation in the Coronation naval review at Spithead, England, in June. The *d'Iberville*, designed to operate in the farthest northern Canadian waters, will carry cargo and medical assistance to any Arctic points which can be reached by water.

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bor much ice *except* where most warm air is over-running a cold front. Then, brother, watch out! The below freezing top of the inversion is wetter than rain and loaded with ice. Danger lurks there.

The lifting or instability effect of mountains and ridges makes it doubly important that a pilot anticipate this type of terrain and cross it as high as reasonably possible.

Pilots disagree on many things but are unanimous when it comes to placing freezing rain as the top menace. There are records of airliners icing up in 30 seconds to the point where they could not maintain altitude. Over-running warm air is again the culprit.

It is hard to beat a 180-degree turn in a hazardous situation like this. Perhaps you could execute a rapid climb to an altitude above the freezing rain when the air is above freezing, but you can't be sure how high you might have to go to reach a safe level. As you nose up you accumulate ice underneath the leading edge of the wing which greatly reduces its effectiveness as an airfoil. Then if you have to push down to regain flying speed it sneaks back over the top of the wing. This is compounding trouble with a vengeance.

Consult the Charts

The forecaster, with the aid of his maps and particularly with his adiabatic chart, can fairly accurately plot the levels of heaviest icing and give you valuable information on how to avoid them. For a good lesson in meteorology, ask the weatherman why the icing is where!

An alert pilot never allows any icing situation to go far without planning what he may have to do. (Little ice can serve as the host for big ice.) He has retained a mental picture of the weather map; changes his route and altitude if necessary. There is no point in ploughing a furrow through ice-clogged clouds when a bit of headwork may avoid them. A handy thing to remember is that the average drop in temperature with altitude is 3½° F per thousand feet.

Carburetor icing is a subject every pilot is impressed with right from the start. However, many pilots tend to forget that carburetor heat is most effective when applied before entering the precipitation or clouds and should be left on for a few minutes after leaving such area. An engine which conks out can't produce any heat for deicing!

At the opposite extreme, don't imagine a trace of ice into something worse. There are those who get hot under the collar at the first hint of ice and sometimes make a hurried move which is worse than doing nothing. Most planes will chug along with a pretty good slug of ice as long as the props are kept clear, either with alcohol or an occasional surging of the props. Centrifugal force helps keep the propeller clean, especially when they need the aid most, i.e., in wet clouds. The heavy water droplets are thrown off.

Propeller ice plus wing ice can add up to a man-size problem and leave you only one maneuver, to descend. But if you act promptly and start the deicer fluid flowing, prior to entering the icing condition if possible, you should be okay.

Beware of Fog

Engine warm-up on a fog draped airport at below freezing temperatures is an excellent way to ice the props into clubs. Have the fluid on as you taxi out—pitot heaters too. Be certain all controls are free prior to take-off. This check should be performed *after* the runup. Taxi slowly. Steerable nose wheels, handy as they are, aren't worth a darn for turning on ice if you are moving a bit fast.

There have been instances of wheels failing to retract all the way or extend properly because freezing slush had been tossed up into the wheel wells during the taxiing. Wings and tail surfaces must be free of snow, ice and frost. Planes have taken off with quite a bit of frost or even smoothly frozen drizzle aboard—but quite a few have spectacularly *not* made it too!

Something that has to be guarded with a watchful eye is clearing to a busy terminal during weather favorable for icing. An ATC delay and holding of maybe an hour can place you in a serious spot icewise. Often there is a cloud layer extending from about 500 to 5,000 feet above the surface. This is a favorite condition at Chicago. Here is an instance where you may wish to ask Air Route Traffic Control or Approach Control to let you hold on top. And remember—ATC and other pilots appreciate any top and icing reports you can offer them.

Incidentally, most of us learned that sleet isn't dangerous in itself but that it is the signal to avoid the area above the sleet where the freezing was taking place. Well, it seems now the theory is that sleet is formed when passing through a very shallow layer of warm air. Snow enters the layer and melts into slush, drops into the much colder air and re-freezes instantly around the ice particles and becomes sleet.

In this connection, one night last winter between St. Louis and Kansas City we flew in above freezing weather at 4,000 feet for about 100 miles. It was raining cats and dogs. We started our instrument approach on the ILS from 4,000 feet and at 2,500 feet picked up a quick wipe of ice across the windshield, then hit the clatter of the sleet. There was about two inches of the stuff on the ground and it was really peppering down at Kansas City as we landed.

According to the latest theory, there is a sharp temperature drop at both the upper and lower edges of the inversion, thus a quick trip through either fringe should be safe. This jibes with the experience described in the preceding paragraph except for the rather deep band of heavy rain.

Landing on an icy runway is tricky. To make the brakes as effective as possible, get the tail up and all the weight on the wheels. Apply brakes intermittently. If you start sliding, your braking is zero. A cross-wind you can handle on a dry runway can be extremely mean on an icy one.

There's one nice thing about winter—so much of the time it's possible to relax on top and enjoy a comfortable, smooth ride. Then, too, summer always follows. END

AIR TAB

A compact flight planning notebook, titled "Airtab" and recently put on the market by Nimbus, Inc., of Falls Church, Va., offers a variety of useful information to the private pilot in a handy form.

Data contained in the pocket-size notebook includes commonly needed material on weather, navigation, radio, and emergency procedures. There's room to fill in all the special data required for a particular flight—tower frequencies, phone numbers for CAA weather offices, airports, rescue units and other air facilities. There's also space to enter flight log notes, for transfer later to an official log. "Airtab" sells for one dollar.

FLAT SPIN

(Continued from page 32)

cockpit. Instinctively, I caught hold of the stick and pulled the airplane back into level flight at about 1,500 feet. It then took me some 10 minutes of very gentle flying before I could stop my feet beating a tattoo on the rudder pedals sufficiently to enable me to make a safe landing.

After landing I dug out the lecturer and reported that I was now prepared to accept his teachings without any practical demonstrations. In his turn, however, he could not give any really satisfactory answer as to why the airplane should have gone into such a very flat spin except that the center of gravity must have been too far aft, although this was difficult to achieve in this particular type of aircraft. At any rate, he did explain that it was my standing up in the cockpit that upset the stability of the spin—it was nice to know that anyhow!

The lesson learned in those few minutes has stood me in good stead since those days. Although I have now completed some eight years as a test pilot, I always make sure that I have plenty of airspace and I never let an airplane have too much of its own way. They are too much like women—you think you are running them but, give them half a chance, and they are running you. END

"AOPA HELPS PILOTS IN TIME OF NEED!"

Says LOWELL SUMNER

AOPA Member A22708

"It's wonderful to have an organization like AOPA ready to help pilots in times of need —and so promptly, too. Today, when the pilot is pretty much on his own, it's mighty nice to have a helping hand in aviation legal and financial matters, as well as everyday flying problems."

Member Lowell Sumner first started flying in 1944. To date he has logged over 2900 hours and holds a commercial certificate with single engine, land ratings. He has owned in turn, a couple of Aeroncas, Cessna 120 and a souped-up Luscombe with a 108 h.p. Lycoming engine. Lowell works as a biologist for the National Park Service, Region 4. He flies for the National Park Service in Alaska and the Western States, taking air photos, counting game, mapping, etc.

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FLYING FARMERS

By BILL RENSHAW

SALESMANSHIP

The 40 per cent drop in farm income since 1947 means one thing for certain—aircraft dealers who have been just order takers must learn to sell as far as farmers are concerned. The days of selling only to farmers who come in asking for a chance to buy are at an end. This does not mean that farmers are to lose their place as number one buyers of lightplanes. It simply means that the airplane "peddlers" must become salesmen in the truest sense of the word. Otherwise they might just as well get in line for relief.

There are thousands and thousands of farmers who have never been off the ground who will start flying tomorrow if someone will just sell them *aviation*. All of this is not just the belief of this columnist. It is the opinion of scores of Flying Farmers, like O. G. Edwards of Dexter, Mo., who says, "I believe there are a dozen farmers in my county who could be sold an airplane."

This column has always believed that a farmer if he is a *good* farmer can afford an airplane. To get the answer as to just how good (or big if you prefer) he must be, we have gone to grass root farmers in every section of the nation. Their replies seem to indicate that we have been doing a very poor selling job.

For the most part, the Flying Farmers we have heard from to date do not feel that a farmer has to be a really big operator to make an airplane pay its way.

There are, however, a few like Ralph Long of Cape Charles, Va., who answers our question, "Does your airplane pay its way on your farm?" with an emphatic "No." Long adds, "It's not the size of a farmer's operation that determines whether he can afford an airplane but how big is his desire for a plane."

Long feels that "high priced airplanes" and "costly flight instructions" are retarding interest in aviation among farm folks.

Most FF's heard from, like O. G. Edwards, do not list flying costs as retarding interest in aviation in their areas.

On the other hand, Edwards points out that many farm airplanes are used more hours than are some farm implements such as combines, cotton pickers, bailers, etc.

Edwards is quick to state that the farm airplane can be a source of "much pleasure and recreation," adding, "It has enabled us to visit many interesting places that we would never have seen without it. It keeps us young at 64."

Many medium size farmers, like Walter Kimble, Secretary of Illinois FF's, find that a few very special trips each year keep their airplane out of the red ink category. Kimble tells how he recently saved close to $250 on a trailer type sprayer by use of his jointly owned airplane.

The saving was effected by "looking over the field" as far as sprayers were concerned. Kimble says: "I would not have had time to do this if forced to travel by any other mode of transportation."

The many uses farmers are making of their airplanes will be discussed in this column in an early issue.

★ ★ ★

DANGER AREAS

Flying Farmers can render a real service by cooperating with the military in educating the flying public to the hazards of flying through designated Danger areas.

Such flights also interfere with important work being done at military installations, within the published Danger zones.

Flying Farmers working with local airport operators and other aviation organizations would do well to establish hard, fast rules. That would disclose pilots who deliberately violate the boundaries of these zones.

Virgil Joyce, President of Indiana FF's, says, "If we don't police ourselves, we may wake up some fine morning to discover that the military has been forced to take drastic policing action." Joyce suggests a two-point program. 1. A voluntary educational program at the local airport level. 2. A strong committee of local pilots to talk with deliberate offenders.

★ ★ ★

TAIL TACTICS

Many lives have been lost because airport operators have not had authority to ground "rambunctious" pilots intent on flying under dangerous circumstances.

Grounding a pilot without resorting to force need no longer be a problem, judging by the example of Walter Schreiber, Greencastle, Ind., airport operator.

When a pilot from a neighboring city took on too many beers, Schreiber tried to talk him into staying on terra firma without success.

When said pilot turned on the power preparatory to taking off, quick-thinking Schreiber took a seat on the tail assembly, thereby grounding both plane and pilot until a State Trooper arrived.

Intoxicated pilot was hauled off to the county jail to reflect on how just a few beers could make an airplane so tail heavy.

★ ★ ★

ONE MAN'S MEAT

"The weather will be fine tomorrow, sir, and possibly good for several days." If the forecaster had been making that to a Flying Farmer, he would have expected and deserved a cordial "thank you." Instead, the chap on the other end of the wire muttered, "If that's the best you can do, mark me off your list. How do you expect me to catch night crawlers if you guys don't let it rain." Pity the poor weather man.

★ ★ ★

AIRLIFT FOR MOTHERS

Flying Farmers everywhere can doff their caps to Adams county, Illinois, FF's, who gave 34 mothers their first airplane flight on Mother's Day.

Champ in the Mother's Day airlift was Rome Boekenhoff of Quincy, Ill., who gave a dozen mothers special recognition by showing them the beauty of this world of ours as it can be seen only from a light airplane.

All Flying Farmers who participated in the Mother's Day airlift will be awarded "Ambassador of Aviation" certificates at the annual field day of mid-west Flying Farmers tentatively scheduled to be held at Purdue University, Monday, August 3.

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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

TOWER PRIORITIES

When the CAA recently announced they were shutting down 18 control towers around the U. S. as part of their current economy drive, AOPA became concerned with the fact that some of the towers on the list were at unusually active airports. Examples: Baltimore's Harbor Field, with 8,005 plane movements officially recorded during April; San Antonio's Stinson Field with 7,502; Westchester County Airport at White Plains, N. Y., with 7,625; Hartford, Conn., with 5,774; Bridgeport, Conn., with 5,698; and so on.

These totals contrasted sharply with those of many CAA towers which were ordered retained, despite such comparable April totals as these:

Asheville, N. C., with 3,371; Augusta, Ga., 3,186; Binghamton, N. Y., 2,331; College Station, Tex., 1,340; Lynchburg, Va., 1,715; Pendleton, Ore., 2,075; and many others.

Upon questioning CAA officials about this apparent discrepancy, AOPA was advised that the 18 towers were selected on the basis of a standard criteria used by the CAA. AOPA then asked to see that criteria, and a copy was sent National Headquarters.

After studying the criteria, it was quite clear to AOPA officials why the 18 towers were selected for decommissioning. The criteria concerns itself almost exclusively with the needs and wishes of the airlines. For example, a point rating system is used to arrive at a certain minimum point score, which then is used to justify the establishment and existence of a tower. Under that scoring system, an airline aircraft movement (a movement is either a landing or take-off) is scored at 10 points. A transient civil aircraft—even though it might be a DC-3, *Lodestar*, Twin Beech, or any of the widely-used lightplanes—is only scored as five points. A local non-airline civil movement is scored one point.

AOPA immediately commented to Fred B. Lee (AOPA A1585), CAA administrator, that the criteria was so lopsided in favor of the airlines that immediate steps should be taken to revise the entire rating system, and that vitally-needed airways and airport facilities should be left commissioned until a fair and equitable criteria could be established.

AOPA was recently advised that the criteria now is being studied for revision.

GEISSE GEAR

After long delay, deliveries have started on the new Geisse crosswind landing gear, being produced by the St. Louis Machine Co. of St. Louis, Mo. The first 50 sets of gears for Cessna 120's, 140's and 170's are going to AOPA members. According to Guy S. Forcier (AOPA A79812), St. Louis Machine Co. sales manager, an additional 30 gears are being allocated for AOPA members at the special price of $112.50. The new list price will be $250.

This is the new crosswind gear that was invented by John H. Geisse (AOPA A60752), who is generally credited with being the "father of crosswind landing gears." He was the CAA official directly responsible for the specifications which resulted in the development of what now is the Goodyear crosswind gear, the first gear of its kind on the market, and extremely popular with pilots.

The new Geisse gear is less expensive than the Goodyear and is of an entirely different design. It was designed by Mr. Geisse after he left CAA, and is being manufactured by the St. Louis Machine Co. under the Geisse patents. The arrangement between Geisse and the St. Louis company was made as the result of an item in AOPA's Confidential Newsletter, which brought the inventor and manufacturer together.

CANADIAN CHANGE

The recently-formed AOPA of Canada has decided to change its name to Canadian Owners and Pilots Association (COPA), giving that organization an identity of its own. However, COPA will continue to affiliate closely with AOPA in the United States.

Meanwhile, that new organization is continuing to make its mark in Canada on behalf of civil aviation there. One of their latest accomplishments has been to induce the Canadian Department of Transport (Canada's CAA) to implement the VHF Unicom frequency (122.8 mc) in Canada. That government body has just announced that Unicom is about to be put into effect in Canada, and will be licensed for operation on much the same basis as is Unicom in the United States.

SIMPLIFIED CHARTS

AOPA recently participated in a conference with the U. S. Coast and Geodetic Survey in Washington at which plans were laid to simplify the present Sectional aeronautical charts, and redesign them primarily for VFR flying.

AOPA and others in civil aviation have long felt that the Sectionals, though actually intended for VFR flying, have become a catch-all for all sorts of unrelated aeronautical information, both VFR and IFR. Recognizing this fact, the C&GS recently held discussions on the subject and now are preparing to reconsider everything shown on those charts from the point of view of the VFR pilot.

Typical proposed changes: shorten radio range legs on charts to minimum and uniform length; emphasize landmarks; show highways and railroads more prominently.

C&GS also is contemplating gradually increased use of pictorial relief on charts instead of present contour system.

INSURANCE PAYS

In one recent 12-day period the American Mercury Insurance Co. ("Americo"), AOPA insurors, paid six death claims under AOPA's automatic coverage of Active members. Each Active AOPA member automatically gets $700 coverage the first year he joins. If he continues to renew, that insurance increases $100 per year until it reaches $1,000.

"Why aren't you over in Korea with the rest of the boys?"

Low & Slow

(Continued from page 29)

school classes in navigation, weather, aircraft maintenance, flight instruments, aerodynamic principles, and physical training. For approximately 17 weeks, he eats, drinks, and sleeps flying at San Marcos. At the end of this time, if he is one of the fortunates who have not washed out, he has accumulated a total of 130 hours of flying time, including 15 hours of Link trainer time and 15 hours of instrument time under the hood. He is now considered a pilot, but not yet an Army aviator. He has three more months of training before he receives the little wings which are the badge of that flyer extraordinary, the Army airman.

In three months, at Fort Sill, he learns the why of the constant demand for precision at San Marcos. Now he learns to fly the Army way, low and slow, landing on roads, pastures, sides of mountains. He learns to evade enemy aircraft while performing the Army's missions of observing artillery fire, limited aerial photography, laying wire, ambulance service, dropping supplies and general observation of the Army.

The first four weeks at Fort Sill are spent in perfecting aerial maneuvers in the L-19 type aircraft. Stalls, spins, chandelles, lazy eights, and steep turns are practiced at from 3,000 to 4,000 feet, and elementary eights, pylon eights, and rectangular courses at 500 feet. Perfection is required, and at any point in a maneuver the instructor may pull the throttle back and call, "Forced landing!" The student must pick a field, tell the instructor which one he has chosen, then glide the aircraft into it. This constant practice of maneuvers at 500 feet and higher is continued until the student acquires the required precision and the ability to make good his forced landings. Only then is he considered ready for the tactical phase of Army Aviation training at Fort Sill.

Power Approach

He begins this phase of training by learning how to make power controlled approaches at one of the large stage fields at Fort Sill. The Army borrowed the technique for the power approach from the CAA and the Navy. All find it invaluable in getting into short air strips. It is simple in theory but very difficult to do since the slightest miscalculation might cause a stall and result in a crash. It consists of selecting a point on the ground on which you wish to land, slowing the airplane to a minimum gliding airspeed, then controlling the rate and angle of descent by judicious use of the throttle. With this approach, the airspeed is just above stalling speed, and when the throttle is suddenly cut completely a full stall results. The throttle is used all the way to the ground and the pilot cuts it just as the wheels touch the ground. This results in contacting the ground at a low ground speed and with a short forward roll.

After the student learns to make a power approach to a point on the ground, a barrier is erected just short of the point

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APPROVED FOR VETERANS

AIRCRAFT INDUSTRY OFFICIALS PREDICT A GREAT SHORTAGE OF ENGINEERS and the situation will become more serious. There are fewer engineers—and enrollments in engineering schools are diminishing. 50,000 graduations in 1949 & 38,000 in 1950 have dropped to 26,000 in 1952, covering all phases of engineering in all fields. Students should consider engineering as a way of serving their country and at the same time preparing themselves for a career cram full of opportunities—In our scientific age there will be an ever increasing demand for engineers.

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on which he is to land. The barrier consists of two poles, approximately 15 feet high with a cord between, and is intended to simulate trees. A few hundred feet farther on to one side of the landing lane a take-off barrier is set up and two flags are placed about 400 feet in front of it. The student begins his take-off from these flags and must clear the barrier. For approximately 10 days the student remains in this traffic pattern practicing power approaches and maximum performance take-offs. When he becomes proficient in landing and taking off without breaking the barrier cords, he graduates to making landings on short strips on the Fort Sill reservation.

First, he is taught how to make a high and low drag of a strip. A high drag consists of flying several hundred feet above the area where he intends to land and looking for obstacles such as trees and telephone or power cables. The low drag consists of flying parallel to the strip of ground on which he intends to land and at an altitude low enough to enable him to observe ditches, holes, stumps, rocks, or other surface obstructions to landing.

The first strips on which the student lands are comparatively long—1,000 to 1,200 feet—and the trees at the end may be little more than overgrown bushes. Gradually, he is landing on shorter and shorter strips where the trees are from 10 to 20 feet high. Eventually, the student is putting his plane down on narrow dirt strips less than 500 feet in length where an error in judgment means a crash into trees or, at best, tearing the landing gear off in the ditches and holes which mark the edges of these strips.

ABOUT THE AUTHOR

As FLYING went to press, a letter was received from Captain Weyman S. Carver, author of "Low and Slow," with the following information:

"I am now in Korea as Division Artillery Aviation officer. During the past five months I have been putting into practice all that I wrote about in 'Low and Slow.' To date I have 214 combat missions for a total of 470 combat hours and expect to fly a minimum of 300 missions before my assignment ends here."

Nor is this all. He is given extensive night flying training and learns to take his little aircraft in and out of cow pastures with the aid of a few flarepots. He makes 400-mile cross country trips on which he practices radio, pilotage, and dead reckoning navigation. In the big hangars at Fort Sill, he performs a major inspection on his aircraft and gets to know it inside and out. He installs a special camera in his plane and actually makes aerial photographs. He observes artillery fire, drops supplies, and lays wire with his L-19. He learns how to set up and maintain a landing strip.

After approximately seven months of rigid training he receives his wings—small silver ones proclaiming him an Army aviator. The practically nil casualty rate for Army aviators proves that his way of flying is not dangerous . . . *for Army aviators.* END

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Operational Altitude

(Continued from page 31)

Let's assume that you take the same airplane off the 5,000-foot airport, but instead of the *normal* temperature of 41.2°, as in the first example, the temperature is 65°.

What difference does that make?

Simply that, for all practical purposes, the air surrounding the 5,000-foot airport is now the same as would *normally* be found at 6,400 feet. Higher temperature has made it less dense than it would *normally* be at 5,000 feet, and in order to take off you must increase your run to approximately 1,025 feet before gaining sufficient flying speed to get off the ground!

At the same time, your rate-of-climb has decreased to only 43 per cent of normal sea level performance.

So we find that the actual elevation of an airport is not nearly so important as the *actual altitude of the air surrounding it at any given moment.*

There is the definition of operational altitude. Now, why is it important?

Assume that there is a line of trees at the end of the 5,000-foot airport runway, and that in order to clear the trees, you must get the airplane off the ground with a maximum take-off run of 1,000 feet.

We have already seen from the examples that under *normal* temperature conditions you need only 830 feet to take off, BUT, with a temperature of 65°, *you need 1,025 feet to get off the ground!* Had you attempted the take-off without first figuring operational altitude, you would have ended up in the trees.

There have been cases where pilots tried to take off from fields when the operational altitude was actually higher than the service ceiling of the airplane! You get almost nowhere that way.

Operational altitude is important. By using the two accompanying charts you will always know what flight performance to expect from your airplane, and how much extra room you need on take-offs and climb-outs.

The charts make your flying safer; that's reason enough for understanding—and using—them. END

Sweat vs. Tears

(Continued from page 14)

been selected as a Civil Defense Air Arm base.

Incoming and outgoing flights on a busy week-end average 400 to 600 a day, when it is estimated that a touch-down or take-off occurs once every 45 seconds. There are often 10 or 12 aircraft in the traffic pattern at the same time, with another dozen waiting on the taxi strip for a "cleared to take off."

All this activity keeps the line crew hopping and the partners make sure they have interested and efficient personnel to do the job. None are hired unless they express an interest in learning to fly. They receive special rates and plenty of opportunity to fly, since the operators believe that line personnel who fly are more capable of meeting the needs of the customers than non-flyers.

Naturally, all this flight opportunity results in a certain amount of personnel turnover. At least two of the line crew have left to accept jobs as airline pilots.

The school offers ratings from private pilot to ATR and more than 100 graduates are now pilots on domestic and foreign airlines. More than 300 have served, or are serving, as pilots with the Air Force, and a hundred more are flying corporate aircraft.

The Zahns partners are distributors for Mooney and Taylorcraft and dealers for Piper and Beech. In 1952, the sales of new and used aircraft amounted to nearly $120,000. Of this, $65,000 represented used aircraft sales in the $1,000 to $5,000 private pilot class.

Corporate flying constitutes a large part of the business, but it wasn't until last year that airport operations—without the aid of school activities—paid their own way. The field now has 40 corporate aircraft including 1 DC-3, 6 Twin Beech's, 8 *Bonanzas*, 1 *Mallard*, 1 *Beaver*, 3 *Widgeons* and 5 *Tri-Pacers*.

With corporate activity showing a sharp rise last year, and a continuing complement of 400 to 600 flight students, the future of the airport looks bright. *And all this has been achieved without municipal help of any kind.*

MERCY MISSION

Frank Steinman, pilot, and his wife, Lisa, a trained nurse, prepare to take off from Zahns in their Twin-Cessna. Their mercy flights have taken them to all parts of the United States.

It wasn't easy.

Money Scarce

Bankers, approached by the partners for financial help in the early days, turned thumbs down. They refused to lend money until the partners could present proof that the program under the G.I. Bill had Government approval. The Government refused to approve the school until the operators could prove they had the equipment necessary for a full flight training program. It was a merry-go-round. Finally a local bank—The Babylon National Bank and Trust Co.—agreed to take a chance. Within one year, the loans were repaid and the airport was on its way.

Zahn, Hoffman, Looney and Lyons attended local civic meetings and talked flying to community leaders. They sat down with their airport neighbors and ironed out operating annoyances. Often this meant a complete revision of plans; but they felt that without community

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12-LIF	12	110	50	35	25.55
* 6-RSD	6	110	85	75	39.25
*12-RSD	12	110	125	100	39.25
32-RSD	32	110	150	100	39.25
110-RSD	110	110	250	150	39.25
*12T-HSG	12	110	250	200	96.45
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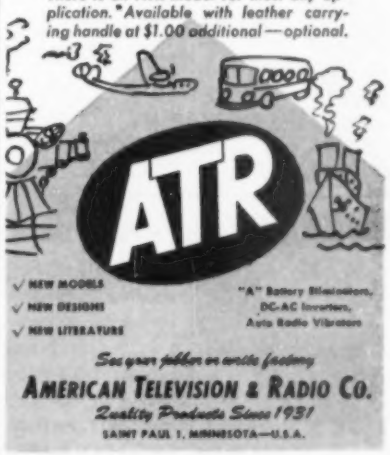
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CHANNEL WING IN BEING

Above is the first actual photograph of the new, all-metal CCW-5. The designation stands for Custer Channel Wing, five-place. The needle nose of the plane (not included in artist's sketches released earlier) houses an angle of attack indicator used on channel-wing aircraft to register the approach of the hovering position. First flight tests of the craft were scheduled to be made shortly after the release of this picture.

support they would be lost—so they changed them, willingly.

They brought civic groups to the airport and showed them what they hoped to do. They talked to newspaper editors, enlisted their support. They encouraged flying activities among school children and kept the phones busy while they talked with parents of the youngsters.

They offered their facilities for emergency and charitable causes and in one instance received national recognition when a young girl was partially cured of deafness after a Zahn airplane had put her through a series of dives and spins on her doctor's recommendation.

A concentrated campaign to interest G.I.'s was launched. Direct mail was utilized, with postcards sent to all veterans to advise them of their flying rights. The partners spoke before veterans organizations and sought their aid in spreading the information.

No high pressure salesmanship was used, but the systematic, conservative selling approach paid off.

Meantime, all profits were re-invested in field improvements and additional equipment. More J-3 *Cubs* were purchased. The maintenance crew was increased. Additional land was purchased and the runway extended and surfaced.

Despite the rapid enlargement, all moves were made on a cautious financial basis. This was proved in 1950, when a large hangar, three-quarters completed, was completely destroyed during a hurricane, and again in 1953 when the original Lyons Flying Service hangar burned to the ground. The corporation has survived these setbacks, and continues to expand.

When famed Roosevelt Field, at Mineola, L. I., gave way to an industrial development, the only airport in the area capable of handling the aircraft was Zahns. The New York Daily News built its own hangar on the field and moved in Buster Warner and Al DeBello with the *Mallard* and *Beaver*.

Ollie Davis and the Texas Company's *Spartan* shifted operations to Zahns. Soon the planes of Gulf Oil Corp., Esso Standard, Goodyear Tire and Rubber, E. R. Harriman Co., and John Hay Whitney Corp. were a common sight on the apron.

Local Enterprise

These are large companies, and to most of them flying is old stuff. In contrast, Lyons likes to point out that of the corporate aircraft based on the field, 22 are from local companies, most of which owned no aircraft before.

Zahn, Hoffman and Looney agree with Lyons that there is no pat formula for the successful operation of a private airport. But they feel strongly that most private airports are unsuccessful because the operators don't know how, or are unwilling, to "go out and get 'em."

They know how at Zahns Airport. I got my license there last month. END

Mach Over Mojave

(Continued from page 23)

the data. One sled with its rockets flew off the tracks, and sailed 500 feet through the air before it crashed. Another sled went through a wall of sandbags 20 feet thick before it slowed to a stop.

At Edwards, the Air Force also has testing facilities for high-thrust rocket engines, for use by industry so that these large facilities won't have to be duplicated. The new Rocket Engine Test Station is located on isolated Leuhman Ridge, 20 miles east of the AFFTC. Two test stands built on the side of a cliff permit vertical firing. Each stand is a two-deck framework mounted on a reinforced concrete foundation. The metal decking can be removed to permit horizontal or vertical firing from either deck. Between the test stands, the control room is built into the side of the cliff.

A vast precision bombing range lies just east of Rogers Dry Lake and south of the Rocket Test Station. It is operated by the Aberdeen Bombing Mission, a branch of the Development and Proof Services of Aberdeen Proving Ground, Md. Here research is conducted on experimental and standard aerial bombs and components. END

Drop Everything

(Continued from page 37)

a permanent landing strip at the strategically important site.

Dropping windows, doors, bulldozers, weasels, road scrapers and other items, many of which had never before been dropped from a plane, was a challenge in itself. Add to this the fact that the base of operations was the farthest north air base in the free world, more than 5,000 miles from the home bases of the First APO and the 435th Troop Carrier Wing which did much of the flying, and problems began to multiply.

Nord, as the Danes call the site of the weather station, is another 700 statute miles farther north and east, on the northeastern tip of Greenland. At this remote Arctic outpost, snow, ice and low shore lines blend into one vast whiteout that makes accurate paradrops almost impossible. To find the site on one of the early reconnaissance flights the pilots had to get down on the deck and follow the tracks left by a ground reconnaissance party on the sea ice.

But the 435th Troop Carrier Wing and the First APO took on the "almost impossible," and while it took a little longer than the merely possible, thanks to savage Arctic weather, they delivered the goods after all other means had been tried and failed.

The original plan was to land C-54's on the sea ice, at the Nord site. But snow, packed hard by 100-knot gales, covered the ice four feet deep. A bulldozer was landed on a clear ice strip 60 miles away, but it took the big cat 13 days to negotiate the 60 miles, then the seven-ton 'dozer proved unable to pull itself out of the drifts, much less clear a landing strip on the ice.

Window Drop

To air-drop the approximately 180 tons of building materials, supplies and equipment required about 50 tons of specialized equipment worth more than $200,000, which had to be flown to Thule in Northwestern Greenland. To deliver a 3,000-pound load of doors and windows, complete with glass already installed in the fibreboard sections prefabricated in Denmark, required a 620-pound steel platform or pallet worth more than $2,100.

Kapok padding scientifically designed to absorb the required foot-pounds of landing shock was spread on the platform, covered with a heavy canvas tarpaulin, which was used to wrap the load. Each bundle of doors and windows was banded with steel straps for added protection. The load was banded together, wrapped in the tarpaulin and lashed to the canopy with nylon straps. A special cargo parachute with a 100-foot canopy was packed and placed on a plywood platform atop the load.

Two such loads were run into the barnlike body of the C-119 on rollers. To extract the load from the plane with the speed and precision required for accurate delivery, a huge ribbon parachute was rigged to the load, attached to a smaller nylon pilot parachute. A 12-pound sand bag was attached to the glider release. When the pilot pulled the release, the sand bag fell pulling the pilot parachute, which pulled the extraction parachute, which, in turn, jerked the load out of the airplane, then opened the main cargo parachute. When two pallets were loaded in the same plane, the second extraction parachute was attached to the first load, so that one followed the other at a 50-foot interval.

And it worked. Dropped from 2,000 feet, the windows were delivered with no more than a few panes of cracked glass. Two cargo parachutes were required to deliver the 5,000-pound weasel, undamaged. Three were employed on the 7,000-pound scraper to be used in runway construction. One was sufficient for the 4,195-pound tractor; one for the small grader; one for delivery of the ubiquitous jeep without which no project could prosper; and two were used on most of the 5,000-pound loads of materials and supplies.

Nothing Too Heavy

Heavier equipment has been dropped—but only on special tests, using special rigging. Heaviest known successful drop was a 16,000-pound road grader for which a platform, rigging and suspension harness had to be especially designed and built. Normal maximum payload of the C-119 is 12,000 to 14,000 pounds, depending upon the gas load and the dry weight of the particular plane. For this drop the gas load was just enough to take off, make the 15-minute flight to the drop zone, drop the grader and scurry back to land. A six-by-six truck and a 14,000-pound bulldozer have also been dropped experimentally.

Project Parkway was no experiment, however. Every flight approached the maximum range of the aircraft, leaving little margin for unexpected winds or weather. Every pound of cargo, designed and built to fit into a specific niche, had been shipped months in advance by water. There was no time to replace any equipment or parts that were broken or lost. The First APO and the Troop Carrier pilots met the challenge, delivering approximately 200 tons of miscellaneous cargo by parachute and free drop with only minor damage. Delivery of more than 500 tons of cargo by drop and air landing was accomplished with only five per cent damage overall.

The plan called for free-dropping such items as structural steel and heavy timbers without benefit of parachute. Glass flasks, properly packaged, had been dropped without chutes and had come through unbroken.

Yet when a load of tough six-by-six timbers, 20 feet long, were slid out of the big *Flying Boxcars* into four feet of snow from an altitude of 50 feet at an airspeed of 110 mph, several were splintered and broken. Another load of four-by-fours in shorter lengths was banded with steel and supported by parachutes, but several of these timbers also broke.

Bane of the drop masters were the high winds that scourge the grim east coast of

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Greenland. The loads were designed to withstand the vertical shock of landing, but not the tumbling and rolling that results from landing in a drift. To prevent the huge cargo chutes—larger than the sails of most yachts—from dragging their loads off across the frozen Arctic, a patented disconnecting device was employed. Ten seconds after the load was dropped, two firing devices cut the safety cords that prevent accidental operation of the disconnecting mechanism. The load would not disconnect, however, until the strain on the risers was relieved by the landing impact. Then the connecting pin was dislodged by springs whose tension could be varied with the load.

Normally a parachute will collapse, once relieved of its load. But, in the Nord project, a few snatched by sudden winds that sprang up, after the *Flying Boxcars* had passed the point of no return across the ice cap, took off across the Arctic ocean bound in the general direction of Spitsbergen, 300 miles to the east, or Russia, 550 miles to the northeast. Another international incident!

JET TEST CENTER

The Navy's largest laboratory for testing turbo jet and turbo prop engines under all simulated flight conditions is being constructed at West Trenton, N. J.

To recover the parachutes and rigging, a Sixth Air Rescue Service SC-47, equipped with skis, landed on the snow at the Nord site, then took off again with the aid of RATO (at $3,200 per take-off). Recovery of the bulky plywood and metal pallets was delayed until the airstrip was completed and they could be airlifted by C-119's and C-54's.

C-54's at Work

The C-54's, work horses of the Northeast Air Command, provided aerial delivery service during the first stages of the project, free-dropping more than 100 tons of diesel oil, kerosene and gasoline at the Nord site with minimum loss. Dragging the site at 50 feet, their props kicking up a snow storm, the NEAC crews shoved out as many as 24 barrels at a pass, without breaking a drum. Secret of their success was not only minimum altitude and airspeed, but draining of 10 gallons of fluid from each drum. The loss approached 50 per cent when full drums were dropped from higher altitudes. NEAC is continuing to supply the site by free drops, as required, during the winter and spring months. Heavier supplies will be air-landed during the brief month or two of summer each year, when the land strip can be cleared of snow.

If more machinery or heavy equipment is required, the First APO and the *Flying Boxcars* of the 18th Air Force will be called to the rescue. They may be back in the para-freight business in a big way in the not too distant future, judging by Danish announcements that further stations are to be opened by the Air Force on the east coast of Greenland. END

I Learned About Flying

(Continued from page 40)

short field 1,000 feet above sea level. I overshot, but managed to avert an accident by a ground loop, an embarrassing performance with my instructor and fellow student pilots looking on.

I then settled down to a real Alaskan breakfast—my first mistake. Meals are expensive in the Territory, but substantial. I had sourdough pancakes, sausages, eggs, bacon, toast and a few cups of black coffee.

I made my second mistake by not gassing up before taking off. I had dumped the auxiliary tank in the *Chief*, which holds eight gallons, just before landing, and the main tank holding 15 gallons was full. Lesson Number Two: *Always top all tanks when going cross-country.* So what if gas was 60 cents a gallon? In about two hours I would happily have paid six dollars a gallon.

I took off and flew to nearby Central airstrip, shot a couple of landings for practice on short fields, and then headed back along the highway. I had just passed Miller House, a mining camp along the road, when I ran into a thunderstorm.

A student pilot's first encounter with a thunderstorm is not easily described—something like being tumbled about in a concrete mixer. As I bounced around in the ship, my fine breakfast bounced around in my stomach until the latter protested. Leaning as far out the side window as my safety belt permitted, I surrendered my meal to the tundra below.

Lost!

Refreshed somewhat by the slipstream, I turned back to the job of flying the airplane. Looking down, I saw, or rather didn't see, something which made me break out again in a cold sweat. The Steese highway was not in sight. I was lost somewhere over interior Alaska with only two hours gas.

First I tried to orient myself by the compass. A lightplane compass is a fractious thing at best, but with a variation of 30° and a dip angle of 77° the northerly turning error makes one virtually useless up there. Then I did some figuring. If I were north of the highway, and on a northerly heading, I would come out over the Yukon River Flats in very desolate country. My chances of being found there would be small. If I headed southwest I would come out on the Tanana Valley, fairly well populated for Alaska, or possibly the Alcan Highway. Accordingly, I took a course which was roughly southwest by the sun.

At first, I was optimistic. A succession of green ridges passed under the wings, each one looking like its neighbor. I strained to catch a glimpse of the level green plains of the Tanana Valley. An hour and a half went by. The gas gauge was showing near empty and bouncing around, and I knew a decision would have to be made in the next half hour

I passed several saddles and ridge tops that were free of trees and looked fairly level. I could probably have made a

safe landing on one of them, but I kept putting it off. After all, the Tanana Plain was certain to be beyond this next ridge line. This was Lesson Number Three: *If you are lost and running out of gas, resign yourself to a forced landing and make it while you still have power.* I was just crossing a deep valley between the ridges when the engine coughed and quit for good.

It was Dr. Samuel Johnson who said, "Count on it, if a man knows he is to be hanged in a month it concentrates his mind wonderfully." Similarly, if a man knows that in a minute he is apt to be rolled into a heap on an Alaskan hillside, miles from any other human being, it likewise stimulates his brain cells.

Creek Landing

I recall only an icy calm as I cut the switch and trimmed the ship for the normal glide. I decided that my best chance was to pancake the ship into the creek bed. Accordingly, I headed for a place where the creek seemed widest, meanwhile avoiding fir trees whipping past the wing tips. The creek bed came up fast as I brought up the nose into a three-point attitude. There were cracking and crunching sounds as the ship plowed through the willows and brush along the creek bank, a splash as it hit—then silence except for the gurgling of the water.

Unpacking my emergency equipment, I made camp on the creek bank. I was on a flight plan and had reasonable hope of being found. Yet I had heard of many planes disappearing in the North without a trace. I decided to reconnoiter down the creek a way to see if by some lucky chance I was near civilization.

I had hiked a bit in the woods and mountains in this country, but had never been any place where there was no trace of human habitation such as a tin can, piece of paper, or scrap of cloth. Along this creek there were none of these. I could have been on another planet. Walking over the tundra—a sort of soft, spongy, damp moss—was very difficult.

After I had stumbled several times and gotten my feet thoroughly soaked I concluded my fate was in the hands of the USAF 10th Rescue Squadron. If I had to walk out, I would certainly starve or break a leg in the muskeg. I had three chocolate bars and some dried cereal—enough for three days. There were a lot of ptarmigan around and, being unused to man, they were very tame. Possibly I could have knocked one over with a stone but this chance seemed pretty slim. I returned to the ship and got into my sleeping bag to escape the mosquitoes, popping my head out only when I thought I heard engines. This was frequent, as the murmur of the creek sounded like a distant plane to my hopeful ears.

Twilight Rescue

About 8:30 that evening the Dougs came over and a more cheering sight I have never seen. I discharged an emergency flare, and although they gave no sign of having seen it they continued to circle. I concluded that I had been spotted. Exhausted, I dropped off to sleep and awoke about 1 a.m. to see a helicopter hovering over me in the continuous twilight of the Arctic's summer night. Tenth Rescue had come through for me!

I got in the 'copter and was deposited 45 minutes later at Ladd Field, very glad to be alive. It turned out I had been 12 miles south of the Steese, about 40 miles west of Miller House. I must have been unaware of recrossing the highway since it lay on the south slope of the ridge.

I could write an epilogue of my experiences in attempting to recover the plane. That, however, would be better entitled, "I Learned About Alaska From That." Briefly, I hired a bulldozer, or "cat," and with a couple of friends set out from the highway. We spent four days trying to find the ship in the maze of ridges and valleys. Finally, a spotting plane led us to my ship.

We repaired the plane and replaced the prop. The "cat" cleared away 600 feet of runway—no more because the shoulder of the hill blocked one end and the soft tundra the other. Then the "cat" ran out of oil and we ran out of grub.

DAYTON AIR SHOW

Dayton, Ohio, home of the Wright Brothers, will be the scene of the National Aircraft Show and 50th Anniversary of Powered Flight Honoring the Wright Brothers. The show will be held September 5, 6 and 7 at Vandalia Municipal Airport, Dayton.

Gil Monroe, who had prospected the region and knew it fairly well, walked out to the highway.

Two days later Hawley N. Evans of Fairbanks Air Service flew him back in a *Pacer*. Evans was also my flight instructor. The *Pacer* had, in addition to 30 gallons of diesel oil for the "cat," food and spare parts for the ship. Our strip presented pilot handicaps in its abbreviated length, its 2,200 feet of altitude and its rough surface. I suppose it will be a long time before I see a more skillful job of landing a heavily loaded plane than Evans' that day. A three-day diet of grayling trout, sieved from the creek with mosquito netting, was happily ended by his arrival.

I never recovered the ship. Evans stated flatly that it could never be flown off such a high field. He recommended that we wait until winter, when the tundra froze solid to give us more runway, and then fly it off on skis. As I was leaving the Territory that fall, I sold the ship where is, as is.

This concludes my tale of woe. I am now located in Connecticut. I have done a lot of flying since in the White Mountains and in Maine and have learned, I hope, the rudiments of flight planning and aerial navigation over wilderness terrain. I want to learn them thoroughly because I hope to be going back to Alaska someday. All that has been said about the scenic grandeur of the Territory falls short of the true picture. Flying the Alaskan bush is the grandest experience aviation can offer. But it is no game for amateurs. END

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HILLER BUILDS A BETTER HELICOPTER

Rainmaker to Industry

(Continued from page 33)

says Howell. "When the radio network is complete, these men will have a permanent hand in operations."

Howell explains that the workers (some are Indians) are taught to operate radio receiving sets and to run the smoke generators.

Weather information is catalogued and disseminated from Boston to staff members at Arvida, Canada. In turn, Arvida meteorologists pass out information and orders over the Canadian radio network. Eventually, decisions of the day filter down to the hardy bush operator at his lonely outpost.

"About six times a day," Howell says, "these fellows monitor their radios for instructions from Arvida and send back local weather reports."

Admittedly, the business of setting up a weather station radio network in the wilds of Canada has been an expensive project. It has meant flying in gas (propane gas for the generators), antennas, masts, tenting and much other equipment.

Supply planes used are Norsemen and PA 18's. For cloud seeding operations, DC-3's are used. Lightweight amphibious planes are indispensable in keeping the outposts supplied and in rotating personnel.

When a definite strike for rain is decided upon, operators of generators in areas involved are instructed to fire their machines. They are given precise starting and stopping times. Rate of flow of solution is given, as well as the appropriate chemical combination best suited to beguile the "weather" of that particular day.

In operation of the generators, a solution of acetone and other chemicals is burned under pressure in the propane flame. Dense smoke and flame arise and gradually disappear as charred submicroscopic particles shoot far up into the atmosphere. These are particles which magically cause rain-bearing clouds to let go their water content. This operation is apart from cloud-seeding by planes in the upper air levels.

However, it is not enough simply to know how rain is formed, or how to seed clouds in order to stimulate rain. Efficient rainmaking operations require a combination of skills. Weather opportunities must be exploited at the right moment and with the right techniques for maximum effect. The skill to recognize special local conditions and turn them quickly to advantage is important. Efficient field operation goes hand in hand with scientific research and evaluation.

Varied Talents

Howell utilizes the best brains in the business: meteorologists, physicists, engineers, technicians. His men have raided the Federal Weather Bureau for personnel, with promises of bigger pay envelopes, action, travel, adventure, responsibility.

Howell personnel traced one eminent weather expert, Pauls Putnins of Latvia, and finally found him at work on a chicken farm in Ohio. Putnins had been a brilliant professor of weatherology who taught in Vienna and in German universities. During World War II he was sent to a concentration camp. Released as a DP, he came to America under a displaced person quota. Learning of Putnins' whereabouts, Howell promptly hired the learned Latvian.

The rainmaker is not confronted with legal liability. "When our rain stimulating activities pour over into other acreage," Howell says, "we generally get cheers instead of lawsuits." In Canada, where Howell makes it rain hard for Alcan, if the rain spills over into adjoining acreage it is usually the timber interests who benefit.

The large pulp and paper companies are great potential customers for the rainmaker's stimulation methods. Process water in abundance is needed at paper mills. Water, oceans of it, represents the only really practical forest fire preventive to the timber people. At the same time, adequate water supplies are needed to accelerate tree and seedling growth in reforestation programs.

Some of the factors which go into cost of rainmaking involve: 1) size of area to be worked; 2) frequency of operations (whether or not you go from a week to a month without clouds; generators do not work on cloudless days, etc.); 3) whether you are operating, say, in Louisiana, where there are adequate roads to get around on, or in the wilds of Canada, where you have to fly operators to outposts by lakes and maintain radio contact at all times.

Eventually, Howell expects to lower rainmaking costs through use of radar. He considers radar a "super rain gauge."

"You can take a radar set," he says, "and quickly determine where it is raining and how much. Radar provides a magical rain gauge to every mile. It will range over some 25,000 square miles."

No Magician

Howell never boasts that on a certain day he will make it rain over a certain area. As a matter of fact, he honestly admits that in some places it never rains, and where it does not rain he cannot make it do so.

Howell staff members have done weather consulting work for Greece, and currently are negotiating with a Near East country over a rain stimulation program. Howell men are constantly flying to all parts of the globe, and home office files

(Continued on page 64)

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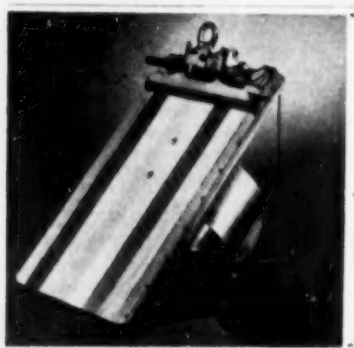

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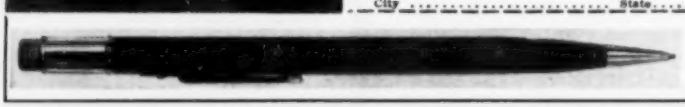

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BELLANCA CRUISAIRS: 15 from $3300. November 1949, #652ZMF, has only 175 hrs. One owner. Aeromatic. Gyros. LF transceiver. VHF transmitter. Extras. Undamaged. Hangared. Relicensed. Exceptional "buy." $4500. Offer wanted.

BELLANCA CRUISMASTERS: 5 available. 1951, #53ZAF, has only 175 hours. Metal Hartzell. Gyros. Omni-range. Extras. Hangared. Undamaged. Relicensed April. Bargain. $9000.

CESSNA 170'S: 35 from $3300. 1950 metal, #990FAF, has 381 hrs. Metal prop. Primary blind. LF. Omni. Beautiful. $5150. Also; 1952, 170B, #277SDF, with 78 hrs. Metal prop. Radio. New condition. $6680.

CESSNA 190'S: 11 available. 1949, #936FAF, has only 290 hrs. Gyros. Omni. Undamaged. Hangared. Bargain. $9000. Also; 1951, #104PDF, with 180 hrs. Crosswind gear. Primary blind. LF. VHF. ADF. Hangared. Undamaged. $11,500.

CESSNA 195'S: 15 from $9000. Recently repainted, 1949, 300 HP, #343TVF, has 604 hrs., engine 75 since factory OH. Chromium cylinders. Flares. Gyros. Omni. Extras. Relicensed. Excellent. $13,625.

DeHAVILLAND DOVE: 1952 painted Dove, #2SRF, has 250 hrs. Special deluxe interior. Hydramatics. Extra tanks. Extra instruments. LF. VHF. ADF. Looks new. $80,400.

GRUMMAN WIDGEON: G44, #5294RF, has 164 hrs. since OH. Painted late 1952. Engines under 239 hrs. New aeromatics. Gyros. LF. VHF. Omni. Undamaged. Excellent. $19,000.

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LUSCOMBE 8F'S: 8 from $2075. 1951, #84QBF, has 148 hrs. Metal propeller. Primary blind. VHF two-way. LF receiver. Relicensed February. Undamaged. Hangared. Like new. $3050.

NAVION 185'S & 205'S: 36 from $5000. Late 1947, #862ZHF, has 650 total hrs., 67 since OH. New 170-hr., 205 HP engine. Latest fuel system. Extra tank. Primary blind. LF. Omni costing $1100. ILS. Heater. Long stacks. Wheel fairings. Air conditioning. New tires. Tail modification. Undamaged. Hangared. Bargain. $5500.

NAVION SUPER 260'S: 12 available. #524TKF has 790 hrs. 1952 50-hr. engine. Metal prop. Gyros. LF. VHF. ADF. Clean. $11,400.

PIPER PACERS: 19 available. 1950, 125 HP, #768JKF, has 335 hrs. Metal prop. Primary blind. Radio. Undamaged. Bargain. $2750.

PIPER TRI-PACERS: 15 available. September 1951, #142SAF, has 235 hrs. Metal prop. Primary blind. Omni. Undamaged. Hangared. Bargain. $4250. Also; 1952 135 HP, #210FAF, with 180 hrs. Metal prop. Primary blind VHF. Relicensed. Hangared. Undamaged. $5200.

REPUBLIC SEABEES: 13 available. #8752XF has 176 total hrs. Standard airplane. Steerable tail wheel. All bulletins. $2000.

STINSON 1948 165'S: 21 from $2800. #647QMF delivered new late 1949. 311 hrs. Skyblade prop. Airfoam seats. Plastic covers. Full blind. LF. Omni. Extras. Undamaged. Hangared. Bargain. $3500.

SWIFT 125'S: 13 from $2000. 1946, #329PKF, has 215 hrs. Aeromatic. Primary blind. Radio. Relicensed. Undamaged. $2450. Also; 1949, #239SBF, with 560 hrs. Engine top overhauled. Aeromatic. Primary blind. IF two-way. VHF transmitter. Loop. Marker-Beacon. Mufflers. Extras. Clean. $3300.

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(Continued from page 62)

bulge with correspondence from officials of Arabia, Cuba, French North Africa, Argentina, Australia, Bermuda, Bolivia, Brazil, Chile, Madagascar, Israel, Turkey, Pakistan, Egypt, Ethiopia and Italy.

Howell still prefers to follow up the industrial inquiry, however. When businessmen commit themselves to a rain-stimulation tryout, they stand by, watching closely what goes on. Once satisfied that the new science isn't just "medicine man" stuff, Howell is in, and contracts get signed.

The Aluminum Company of Canada might very well have had to suspend operations during one crucial year had it not been for the rainmakers.

"Alcan readily concedes this," says Howell, "and it is a generous admission, too, because they have a competent staff of meteorologists of their own. Alcan officials had heard about rainmaking, and when they asked their own weather chief about it, he explained that rain stimulation was more or less a doctor's doctor kind of thing and recommended that we be called in."

Is Howell worried about current efforts to convert sea water into fresh water on a commercial scale for possible industrial use? Not at all. He figures that the cost of such conversion alone will be prohibitive. This seems reasonable, when you consider that a mere 60 milligrams of silver iodide (not much more than a drop of water in size), hurtled into the atmosphere by a generator, can seed a full two cubic miles of the heavens. When you consider that this will stimulate the fall of rain over a considerable area, then you realize that the rainmakers have little to fear from the efforts of the seawater converters. END

Lake-Front Air Strips

(Continued from page 27)

Airport commissioner, felt Cleveland needed a downtown air strip; and he's a determined man. Once superintendent of the U. S. Post Office Air Mail Service, he was loaned to Cleveland to build the nation's first municipal airport, Cleveland's Hopkins Municipal Airport, and he stayed there. Now he wanted the lake-front strip as an auxiliary to the main airport.

"Pshaw," laughed a scoffer. "Where would you put it? In Lake Erie?"

"Sure," replied Berry. "That's the ideal spot. In Lake Erie."

His idea was quite simple. He suggested building a breakwater, then filling it in with the city's rubbish and ashes, street sweepings, and slag from the steel mills. This would save the cost of buying land and clearing approaches, would furnish an ideal spot to get rid of the waste, and would create a field within walking distance of the main business district.

The first phase of the lake-front airport —a simple strip 2,200 feet long—was opened August 27, 1947. It proved an instantaneous success.

Now the strip has been lengthened to 2,500 feet, with 400 feet of overrun at each end, and a row of T-hangars and a small administration building have been added. Gas and mechanical service are available. The city charges no landing fee, but there's a $1.50 tie-down fee for planes remaining over an hour.

The field is open daylight and VFR conditions—three miles and 1,000 feet—only; it may be worked by radio through Cleveland radio, 344 k.c., which has a direct line telephone open constantly to the strip.

The strip's best feature is its proximity to the business district and Cleveland stadium. Central Square is a little more than a mile away, and East Ninth Street and Euclid Avenue, the heart of the business district, is four and a half blocks away.

Lake Shore Boulevard separates the air strip from a municipal parking lot from which buses run every five minutes. The fare is a dime.

Since the strip was opened, it has had more than 150,000 aircraft operations, with planes ranging up to DC-3's. Its biggest day was during the 1949 National Air Races when 508 aircraft were tied-down simultaneously on the field.

Doyle points out that 85 per cent of the strip's use is for business or executive travel. The other 15 per cent is mainly folks who come in to shop, to watch the Cleveland Indians or the pro football Browns, or to eat downtown. Among the regular visitors are executive planes of Standard Oil Co. of Ohio, Anchor Hocking Glass Co., Eaton Axle Co., F. C. Russell Co., and many others.

Cleveland has ambitious plans for the strip in the future. Voters recently passed a $6,000,000 airport bond issue, with $2,000,000 to be used for improving the strip. A new concrete runway, 3,500 x 150 feet, will be built further out in the lake on the fill.

Chicago's Meigs Field

Chicago's Merrill C. Meigs Field is on the Lake Michigan shore, adjacent to Field Museum and Soldier Field, and 10 minutes by cab or bus from Chicago's famed Loop, the main business district.

It has a 2,800 x 150-foot concrete north-south runway, a city-operated control tower that transmits on 206 k.c.'s or 121.3 megs. and receives on 3105 k.c.'s: 121.3 megs. or 122.5 megs.

Air Strip Manager William O'Brien explains the strip has 80, 91 and 100 octane gas, minor repair and tie-down facilities; makes a parking charge of $1 for four hours up to $2 for 24 hours, plus a charge for commercial passengers or freight.

The runways are lighted and the field may go on 24-hour service soon. The city is considering lengthening the runway to 3,500 feet.

Meigs Field had 32,438 flight opera-

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tions—16,222 arrivals and 16,216 departures—in 1952; aircraft ranged up to DC-3's, with a few C-46's. Seventy per cent of the traffic, according to O'Brien, is composed of executive type aircraft, carrying such celebrities as ex-Gov. Adlai Stevenson of Illinois, Gov. Thomas Dewey of New York, Senators Dirksen, Lodge, Kefauver and Duff, Col. Robert R. McCormick of the Chicago Tribune, Gene Autry, Robert Taylor and many others.

Milwaukee's Maitland

Milwaukee's Maitland Field is on the Lake Michigan shore, less than a half mile from Milwaukee's Chicago and North Western, and Chicago, Milwaukee, St. Paul and Pacific Railroad terminals on the main street, Wisconsin Avenue. Cab fare to the main hotels is 60 cents. There's a rent-a-car service on the field and efforts are being made to get a bus stop at the strip, advises Kenneth A. Olson, operations manager for Anderson Air Activities, which operates the strip.

The runway is 2,900 feet long, 300 feet wide, hard-surfaced; the strip has 10 T-hangars which are filled with permanent customers; 80-octane gas is available. There's no landing fee, but the overnight tie-down fee is one dollar. Maitland has VHF Unicom that permits pilots to call in for wind directions, taxicab or other services. The strip has an unusually comfortable "ad" building, with conference rooms, a snack bar and other facilities.

Traffic averages around 300 planes per month, ranging up to DC-3's, and most of it is business travel.

Olson points out that Maitland may even be used shortly as the downtown terminal of a helicopter service, shuttling mail and passengers from the main airport, General Mitchell Field.

Looks as though the handy downtown flight strip is really here. END

Cutting the Cost

(Continued from page 24)

The figure for depreciation is one that can vary considerably. For new airplanes it can be higher than the figure given. For used airplanes of more ancient vintage it might be lower. It is based somewhat on the original cost of the airplane and the actual deterioration of the airplane through use or misuse. Since it is based on the difference between what the airplane cost or was worth at the beginning of the year and what it can be sold for at the end of the year it is doubtful whether a reduction in the fixed cost of depreciation could be realized by building one's own airplane from a kit. It is believed that the older, airworthy, factory-built airplanes will provide the lower figure for depreciation.

Recent Government statistics show that there are 17,137 airplanes with engines of 51 to 100 hp now in existence that are not certified. The majority of these airplanes can probably be purchased for less than the cost of an airplane construction kit and put in airworthy condition and certificated with much less labor and at much less cost than the construction of an entire airplane from a kit.

The above illustrates how the fixed costs might be reduced slightly but not eliminated. The effect on the hourly flying cost is not great enough to bring this cost into the range required.

How, then, can we arrive at a reasonable hourly flying cost? The answer lies in greater utilization of the airplane—flying it more hours per year so that the fixed yearly costs will be distributed over more hours of flying. Obviously a private flyer, owning his own airplane, cannot do this without increasing his overall yearly cost. But—suppose an airplane were owned and flown by 10 flyers, each averaging 60 hours of flying per year. The hourly costs would still be (in our example) $3.21 per hour. The fixed costs on an hourly basis would drop from $9.03 per hour to $0.90 per hour giving a total hourly cost of $4.11 per hour. This is now in the range of low cost flying.

It seems obvious that the answer to low cost flying is a flying club. There are many whose experience with flying clubs in the past has not been happy. But a flying club, properly organized and operated, can well provide the maximum in member satisfaction and the minimum in flying cost. END

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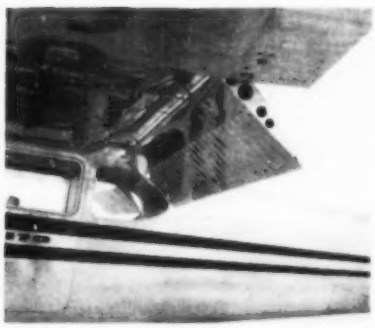

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